FLIGHT and AIRCRAFT ENGINEER

Editorial Director G. GEOFFREY SMITH, M.B.E.
Editor - - C. M. POULSEN
Assistant Editor - MAURICE A. SMITH, D.F.C. (WING CDR., R.A.F.V.R.)
Art Editor - - JOHN YOXALL

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1
Telegrams: Flightpres, Sedist, London. Telephone: Waterloo 3333 (60 lines.)

COVENTRY: 8-10, CORPORATION ST. Telegrams: Autocar, Coventry. Telephone: Coventry 5210.
BIRMINGHAM, 2: KING EDWARD HOUSE, NEW STREET. Telegrams: Autopress, Birmingham. Telephone: Midland 7191 (7 lines).
MANCHESTER, 3: 260, DEANSGATE. Telegrams: Iliffe, Manchester. Telephone: Blackfriars 4412.
GLASGOW, C.2: 26B, RENFIELD ST. Telegrams: Iliffe, Glasgow. Telephone: Central 4857

SUBSCRIPTION RATES: Home and Abroad: Year, £3 1 0. 6 months, £1 10 6.

No. 2066 Vol. LIV July 29th, 1948 Thursdays, One Shilling

The Outlook

One Fight Won

IN the midst of much that is a sorry and even shameful story, it is, perhaps, as well first to count our blessings so that the gloom of disappointment may not be altogether unrelieved by a few rays of hope. The large flying boat has been saved.

Perhaps we may be forgiven if, in order to bring our satisfaction with the reprieve of the SR 45 into the right perspective, we recall a little technological flying-boat history. The early ones were military aircraft. In the first world war they did long patrols and proved worth while, primitive as they were. When civil aviation started after the war, the civil flying boats were slower than their landplane counterparts, and it was argued that the water soakage from which they suffered was the weight equivalent of several passengers. The designers avoided the latter trouble by producing metal hulls. That cured the water soakage, but for a time the hulls suffered from corrosion. The metallurgists found ways and means of minimising that.

Next objection to the flying boat was that it was less efficient aerodynamically than the landplane. We argued that although this was true at the time, there was no basic reason why that should always be so. Shorts justified our faith by producing the Empire boats for Imperial Airways. They were ordered "off the drawing board," but by that time the designers had accumulated so much experience that the gamble (as some regarded it) was justified. The Empire flying boats were a great success, as Imperial Airways found when their services had been running for some time.

Why, it may be asked, did the flying boat fall from favour? The only valid reason ever advanced was that land airports were built in all quarters of the world, while no one thought of doing the same thing for the flying boat, which has always had to operate with makeshift terminal facilities. Even anti-flying boat B.O.A.C. admitted in its last report not only that the flying boat is popular with passengers, but that its utilization was high. Thus the only reason for the Corporation's dislike of the type was the financial one that it had to pay for its own bases instead of being able to use those paid for by others, and merely being charged a landing fee.

The large SR45 will cost the country far less than the large landplane because no costly runways need be provided for it. Southampton Water and the Solent suffice for runways, and perhaps one day Calshot may be given up entirely by the R.A.F. so that a good base can be provided there at a fraction of the cost of a land airport. The bases overseas are another matter and there a certain amount of improvisation may be necessary. But the great point is that, with flying boats, makeshift arrangements will work, even if not entirely ideal. With landplanes they will not, and so the large landplane is severely restricted in its movements.

It is for reasons such as these that we welcome the Government's decision, and we congratulate Saunders-Roe, British South American Airways and Air Commodore Brackley on having won the fight for the flying boat.

The New Charter

INCLUDED in the blessings which we set out to count must be the fact that the Government has at long last made up its mind, and now we know where we stand. Even a decision which is open to challenge is better than the uncertainty which has bedevilled British civil aviation for far too long. The Corporations have come in for strong criticism, much of it justified, but so long as they were left in ignorance they could not plan for the future, and in that respect they, and especially B.O.A.C., deserve sympathy. They never knew, from one day to the next, what political influence was likely to cause upset to most of their plans. Now they have been given the general blueprint and can begin to scheme out the details. Mr. Whitney Straight

has lost no time in announcing his scheme for improving the efficiency of B.O.A.C. We suggest that he and his colleagues should now be left alone to get on with the work, and that they should not, as he put it, "have to look over their shoulders" every few minutes. Let us await results, and let the Corporation be judged on them. It has probably learnt its lesson and will show more reasonableness over the Canadairs than it did over the Tudors.

As for the Government's decision to buy DC-4M-4 aircraft, the sane view is, we think, that conditions had become such that this was the best compromise. Like all compromises, it can readily be criticized, but taking into account all the intricacies involved, it is probably a case of making the best of a bad job. But acceptance of that fact must be accompanied by a determination never again to permit such incredible muddle as the Tudor story to happen again.

The summary of the Courtney Report which we publish this week reveals a state of affairs which, fortunately, is without precedent in British aviation. After the treatment they have received, it is a wonder that everyone at Avros is not in an institution by now. No firm could be expected to produce good results in a reasonable time under such conditions. Lord Knollys put it very simply in the House of Lords when he said: "I am convinced that even now we shall not get one type of aircraft at the time we want them unless the present method is radically changed. There is no chance of getting 'winners' under the present methods."

Not only is there an urgent need to revise the present system of ordering civil aircraft. As Viscount Samuel pointed out in the same debate, the time has come when we should have a fundamental enquiry into the right form of ministerial and commercial organization of civil aviation. The aim, as he put it, "should be to simplify the present complicated and clogging machinery, and to liberate the native energies of the people."

If the British aircraft constructor is provided with a set-up by which he can deal directly with the operator, and can get quick decisions which will be respected and not changed every few weeks, he will produce the right aircraft at the right time.

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Large Power Plants

LAST week we commented on letters that had appeared in *The Daily Telegraph* on the subject of large piston engines. The writers were Sir Roy Fedden and Mr. W. R. Verdon Smith. We have now received from Sir Roy a letter which we publish in this issue. That letter deserves the most careful study.

Sir Roy's anxiety is that the new large turboprop power units may not be ready in time for the SR45 and the Brabazon, and in his letter to *The Daily Telegraph* he advocated that an effort should be made to develop a piston engine in the 4,000-5,000 h.p. class.

Our view, as expressed last week, was that it is now too late to begin on the development of such an engine. We still fear that is the case, and in the letter which we publish this week Sir Roy states that to develop a prime mover of 3,000-5,000 h.p., driving an airscrew, is no sinecure, *no matter what the type*. The words which we have italicized we take to include the large piston engine, and if that is so, Sir Roy himself appears to support our contention.

If we are mistaken in our opinion as to the time it would take to develop such a powerful piston engine and its associated airscrew, then the main point of our disagreement with Sir Roy disappears.

ANNIVERSARY FLIGHT: Making its first public appearance, the Vickers Nene-Viking twin-jet experimental transport last Sunday, July 25th, completed out and return flights from London Airport to Villacoublay, Paris, in record times. In this manner was the 39th anniversary of Bleriot's historic Channel crossing commemorated by another aviation milestone, for the Viking is the first all-jet commercial aircraft to fly over this or any other recognized air route. *(See also page 134.)*

B.O.A.C. Plans and Reorganization

Mr. Whitney Straight Gives Details of Departments and Aircraft

FOLLOWING the important simultaneous announcement in the Lords and Commons concerning the purchase of aircraft from Canada, Mr. Whitney Straight, chief B.O.A.C. executive, last week announced details of the internal reorganization of the Corporation and utilization of its fleet. He had previously made a statement to all levels of B.O.A.C. staff about the new set-up and fleet. A similar survey of B.O.A.C. plans was given at a press conference. The salient points made may be summarized as follows:

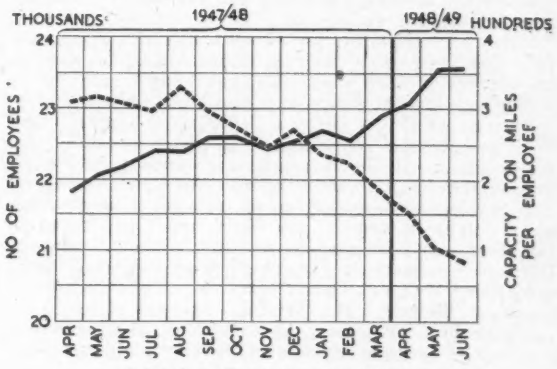
An all-out competitive drive is to be made for traffic, particularly dollar traffic on Atlantic and Empire routes; decentralization is to be the new policy underlying the Corporation's organization. Further small reductions in staff are to be made, but of greater importance is their more efficient employment; close co-operation is being and will be maintained between the three Corporations to avoid overlap, and in order to pool experience. Regarding aircraft, the operation of a fleet of Tudor IVB pressurized freighters and a more adventurous specification for the Bristol 175 were items of particular importance.

The internal organization of the Corporation has been carefully examined with two objectives in mind; first, how the greatest overall economy can be effected, and secondly, "how the method and system can be so improved that chain of control and scope of individual responsibilities are made clear beyond doubt." Mr. Whitney Straight has also made a study of the organization of the majority of the world's principal airlines. The conclusion reached was that the most effective system for the Corporation would be based on a general principle of maximum possible delegation of authority, in other words, "decentralization right down the line."

The new divisional system devised is shown in diagrammatic form. Under it the head office is considerably reduced in size, and full authority is vested in a management committee composed of the heads of divisions. The full headquarters team comprises chief executive, advisory chiefs and heads of divisions. Sir Victor Tait is promoted to deputy chief executive under Mr. Whitney Straight. His work as Director-General of Signals in the Air Ministry, prior to joining B.O.A.C. in 1945, will be remembered.

The new Western Division, under Mr. Vernon Crudge, has a sphere of influence extending from London westward to Australia, and the Eastern Division, under Mr. J. Brancker, extends eastward from London to Australasia and Japan. The Western Division will concentrate particularly on obtaining the maximum possible traffic from the American continent. The Lines and Areas under the divisions will be responsible respectively for types of aircraft and geographical location, each Line will be responsible for one type of aircraft, Hermes, Tudor or Canadair, and it is hoped that a wartime squadron spirit will be fostered in these comparatively small units. The job of the Areas' staff will be, for example, to sell all available seats and space passing through their section or allocated to them. Mr. Whitney Straight suggested a conveyor belt simile: Lines keeping the belt running flat out and Areas keeping it filled with produce.

All U.K. sales, traffic and catering will be the responsibility of the U.K. Region



B.O.A.C. staff reduction (dotted line).

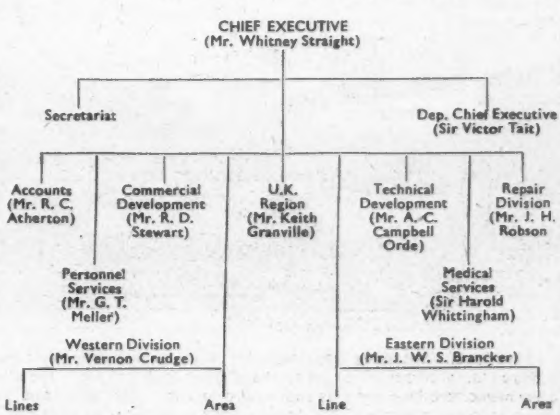
—the housekeeping organization—under Mr. Keith Granville, and Central Supply and General Servicing will come under the Personnel and Services administrative department headed by Mr. G. T. Meller. The Personnel subdivision is regarded as of particular importance, and its head, Mr. Blair-Cunynghame, will be a member of the Management Committee. Sir William Cushion will look after General Services.

Of the two technical departments, one for development and the other the repair division, it may be said that Mr. Campbell Orde's team are in the nature of backroom boys, while the repair division, under Mr. Robson, has undergone very important reorganization to become commercially independent. This means that the section stands or falls on results obtained, and is free to take on outside commitments as it thinks fit. By the same token, B.O.A.C. servicing can be sub-contracted to other repair companies which are able to offer services of the requisite high standard at competitive costs.

Commercial Development, under Mr. R. D. Stewart, like Technical Development, is an advisory, non-executive section.

Responsible directly to the chief executive are the solicitor, secretary, internal auditor, director of medical services (Sir Harold Whittingham, previously Director-General of Medical Service in the R.A.F.) and chief P.R.O. (G/C. F. W. Winterbotham).

Mr. Whitney Straight was unable to give a target figure for numbers in the new stabilized staff set-up, nor was a date given for its achievement. The accompanying curves indicate a drop in the number of employees during the last 14 months of approximately 2,300, and since their preparation it is understood that the figure has fallen to just below the 20,000 mark. It is important to remember that in this figure are included large numbers of native staff employed at airfields on the Empire routes.



The Air Fleet

Referring to the present aircraft fleet, the old stop-gap types and the Tudors, Mr. Whitney Straight said that he did not intend to dig up the past. One chapter was now closed and another had been opened. B.O.A.C. had been handicapped in being unable to make plans

B.O.A.C. Plans and Reorganization . . . . .

until the recent announcement regarding the purchase of Canadairs because they had no definite basis upon which to plan. Now there would be no more apologies, and the Corporation would go out and get business. "The last year has been very unsettling for everybody," he said. "Where we have fallen down is on the aircraft equipment. It is one thing to fly an uneconomic aircraft so long as the aircraft is filled with passengers, but if you fly an uneconomic aircraft empty, then you are in serious trouble. I regret to say that is what was beginning to happen." Mr. Whitney Straight continued: "In the Corporation we regret very much we have had to go outside the British aircraft industry on this occasion. We would rather fly British than anything else, but we have got to keep British airlines flying throughout the world, and I regret that in the short-term view there is no other solution." In the Courtney Committee report on the Tudor II it was suggested that B.O.A.C. should lower its safety standards to fly these aircraft. Mr. Whitney Straight stated most emphatically: "Whatever Air Chief Marshal Courtney or anyone else may suggest or wish, B.O.A.C. will not lower its standards."

Without new aircraft there was a risk that the D.H.106s and Bristol 175s would have become available with no Corporation with sufficient experience or scope to operate them. The decision to buy Canadairs to supplement the Constellations and Stratocruisers gave an opportunity for competitive airline operation, and a chance to B.O.A.C. to become good operators.

Regarding individual aircraft, present and future, for the Corporation fleet, Mr. Whitney Straight made the following remarks:—

The 1950 Fleet

By 1950 B.O.A.C. should be operating a landplane fleet consisting of six Stratocruisers, 11 Constellations, 22 Canadairs, 25 Hermes IVs and 15 Tudor IVB freighters.

Stratocruisers: These aircraft were regarded as a great step forward in air transport design, but delivery date was still unknown. In spite of fears regarding handling in view of the high wing loading, practical experience had now shown that the Stratocruisers handle as well as the Constellations. Bunks could be fitted in the forward compartments if there was found to be a demand for them.

Constellations: The newly acquired Constellations would be put into service on the Australia route starting in September and reaching planned frequency by December.

Canadair IV: This aircraft, developed by the Canadian company, was basically a D.C.4 with British Rolls-Royce engines. The pressurization and refrigeration systems and divided internal layout were up to D.C.6 standard, but fuselage length was the same as of the Skymaster. An improved D.C.6 undercarriage was fitted. The Merlin power plants had proved very satisfactory, but development must continue and more was hoped for. The Canadair IV was an economic aircraft of the right size for the Empire routes, and the Corporation was very satisfied with it in that role.

Hermes IV: B.O.A.C. were confident that Hermes IVs would be first-class short-range aircraft. The first one was scheduled for delivery in January, but this might be optimistic in view of the fact that none of this mark had yet flown. They were not expected to be in operation before the beginning of 1950, although rate of delivery was scheduled for four per month during 1949. There was little operational experience with the Hercules engines, for the Hermes performance was based on 2,200 h.p. for take-off and the Hercules now operating in the Hastings gave only 1,675 h.p. The improvements planned for the Hermes VI—a later version of the IV—which included wing, flap and other modifications, were not likely to be incorporated in any of the 25 IVs now ordered.

Tudors: The Tudor problem was settled and the past should remain unstirred, but there was much to be done in the future. Tudor IIs had failed to meet the basic Empire requirement, and this was nothing whatever to do with seats or equipment; the bare aircraft had failed. B.O.A.C. did not want to see wastage and felt they had a certain responsibility with regard to Tudors. Fifteen Tudor IVBs would therefore be taken for operation as pressurized freighters. The IVB was an Avro/B.O.A.C. development based on the most improved Tudor mark. The conversion was quite simple, entailing a strengthened floor, large doors and cargo handling attachments. There was a definite demand for a pressurized freighter for the carriage of livestock, bottles and other articles which might be detrimentally affected by altitude. The Corporation thought there was a chance of offering a unique service in the freight market and they would "really go for it" with a view to starting a new era with the world's biggest freighter fleet. The carriage of post, parcels and second-class mail was also in mind. Crew training was also being considered, and experienced ex-R.A.F. pilots were running out. A freighter service offered excellent opportunities for pilots to gain experience.

Solents: The Solent would continue to operate until 1950, and, if self-supporting, perhaps longer. The South Africa route was a special case and was commercially attractive when operated with Solent aircraft along air tour lines. Arrangements were, incidentally, being discussed with B.S.A.A. with a view to making B.O.A.C. flying boat experience available to them later in preparation for S.R.45 operation.

Future Types

D.H. 106 Comet: Mr. Whitney Straight described the Comet as the "Great White Hope" of British commercial aviation. B.O.A.C. maintenance engineers had been with the de Havil-

"*Flight*" *photograph.*

***ADOPTED:** The Canadair Four, a 40-passenger pressurized transport which, with its four Rolls Royce Merlin 624 power plants (1,760 h.p. each) is claimed by the makers (Canadair Ltd., of Montreal) to cruise at speeds up to 345 m.p.h. The all-up weight is 82,000 lb. Alternative power plants, as in the Avro Tudor, might be Bristol Hercules sleeve-valve radials. Lord Pakenham's announcement that B.O.A.C. have been authorized to purchase 22 Canadair Fours is discussed on page 136.*

land company for some time, and their experience would be incorporated in the Comet design. The Corporation had great confidence in the D.H. company. There would be airfield restrictions due to the long take-off likely to be required and the high wheel load.

Bristol 175: It was wrong to suggest that this aircraft would be a Constellation six years' late. It would supplement the D.H. 106 on Empire routes, thus overcoming such limitations as those mentioned above. The purchase of Canadairs had permitted a more adventurous approach to the 175 specification, and range, take-off and landing requirements would be reviewed. The Corporation had confidence that it would be a great deal ahead of the Constellation.

Brabazon I (and *S.R.* 45): Providing suitable financial arrangements were made, B.O.A.C. would be glad to operate the Brabazon I. It was to be regarded as a national experiment, and good progress was being made. The first Bristol 167 in developed form and with gas turbines should be ready by 1953.

On the Replacement List

Plymouths and Hythes: These old boats, which had done valiant service, would slowly be withdrawn and replaced by Hermes.

Dakotas and the stop-gap types: Dakotas would soon be used only by associated companies and on Middle East local services, and would not be U.K.-based. Haltons had already gone, Yorks, Lancastrians and Liberators would follow shortly.

Mr. Whitney Straight answered questions following his statement, and said that costs and load factors for the Atlantic run compared well with other companies. From I.A.T.A. figures it could be learned that B.O.A.C. had achieved a revenue surplus of 4.1d per capacity ton mile as compared with three un-named American companies, who, on the same routes, had achieved 3.7d, 3.5d and 2.6d per capacity ton mile.

In answer to a question regarding power for the Canadairs, Mr. Whitney Straight said that B.O.A.C. were interested in some form of compounding for the Merlins.

The Tudor Decision

WE have received the following personal statement from Sir Frank Spencer Spriggs, K.B.E., Hon. F.R.Ae.S., Managing Director, Hawker Siddeley Group, Ltd., Chairman, A. V. Roe and Co., Ltd.:

"The British aircraft industry is shocked at the decision of the Cabinet to dissipate more of our scarce dollars on D.C. 4M 4 aircraft. I do hope that this aeroplane will be required to pass a test identical with that given to the Tudor before any contract for its purchase is signed.

"What will be the repercussions of the Cabinet's decision? One thing is that for the next five to seven years the British aircraft industry will have very great difficulty in selling any civil aeroplanes abroad—for if we don't think British aircraft are good enough to use ourselves, how can we expect anyone else to buy them? It should also be remembered that the expenditure is not confined to the initial purchase price but that for many years to come more dollars will have to be found for servicing, repair and the provision of spares for the D.C.4M 4. As far as I can see, there is no sufficient reason to warrant the purchase of these aircraft. To buy them means not only the cumulative expenditure of dollars abroad but also the elimination of the same amount of British currency being spent on British labour and materials in this country.

"How does all this affect the individual? I have talked to many people at Avro's at Manchester and I know what they are thinking and saying. They know that the Tudor IV is a first-class operational aircraft suitable in every way for the Empire routes and that, given goodwill on both sides, the Tudor II can be made satisfactory in a very short time as they know what is wrong and they can put it right. They know that it is very difficult to design and build an aeroplane when the people who are buying it cannot make up their own minds about what they want. They know, too, that the reports of the Courtney Committee make it more than clear where the fault lies for most of the delays, increases in weight and hold-ups in development which have occurred. Right from the chief executive down to the individual craftsmen on the job—the same craftsmen whose skill helped to build the outstanding bomber of the War—they are one and all appalled at the decision.

"One criticism which was made in the official statement on the recent test of the Tudor II was that the aeroplane did not operate well from high-altitude aerodromes. Few people realize that if the same yardstick that was used on this occasion were applied to all other aircraft in service on these routes to-day, most of them would be grounded.

"Because of Avro's enterprise in producing the first British post-war air liner, which has a pressurization system that is unsurpassed anywhere in the world, they are to-day involved in the biggest mess that any aircraft firm in the country has ever had to face. Unemployment is bound to result from a Cabinet policy of 'don't fly British.' My chief concern at the moment is to take all possible steps to ensure that the largest numbers of the Avro team are maintained in employment"

THESEUS STRIP

THE strip of the Bristol Theseus turboprop unit which completed the 500-hour endurance test described in *Flight* of July 22nd shows that the great majority of components are in remarkably good condition. A selection of these may be displayed at Farnborough during September. It was learned during a recent visit to Bristol that, when the burners were removed for cleaning after 450 hours (as called for by the test schedule), one burner was incorrectly assembled. This, however, was not noted because no test rig for burners was available. The Theseus was restarted, and the run continued to 500 hours, and although towards the end the test observers realized that something was not quite as it should be, trouble was not seriously apparent.

It was found, when the Theseus was eventually stripped down, that the burner had produced local hot-spots and that one stator section of the first stage, and one of the second stage, were badly burned. A test on a Lucas rig confirmed that the burner had, in fact, been wrongly assembled.

CHRISLEA STATEMENT

A MEETING of the Chrislea Aircraft Company, Limited, and its creditors was held on July 21st to submit details of a scheme which would enable the company to be given six months moratorium in which to complete the aircraft at present on hand thereby using the money invested in partially finished goods to best advantage. At this meeting a statement was made explaining why the company has temporarily suspended operations and why it is at present unable to pay its debts. It was stated that the various Ministries concerned had sponsored the manufacture of the Chrislea Ace and loaned an American engine for the prototype. A request for an import licence for more than 12 engines was however refused. As a result of this, the production programme was set back by a substantial period. Another contributive factor was an order received from Spain for six aircraft in May this year; Chrislea's clients, however, after placing the order were unable to obtain the necessary import licence and sterling.

The Statement of Affairs indicates that the assets are substantial and the greater percentage of goods and materials supplied by trade creditors are in the hands of the Chrislea company. What the company requires is that these partly finished goods be converted into finished aircraft and sold. The details submitted were thoroughly discussed, and a committee of five representatives of the principal trade creditors was appointed to confer with the directors of the company with a view to formulating a scheme to be submitted to a general meeting of the creditors to be held within 30 days. If such a scheme can be unanimously agreed to by all creditors, the suing creditors present at the meeting agreed to hold their hands and the loan creditors intimated that in the event of such agreement they would postpone their claims until the trade creditors had received a dividend of 10s in the £1.

INSTITUTE OF TRANSPORT LUNCH

THE annual luncheon of the Institute of Transport held on July 21st at 80, Portland Place, W.1, was the first function to take place in the Institute's new premises. The retiring president, Mr. T. W. Royle, C.V.O., M.B.E., introduced and welcomed Mr. D. R. Lamb, the president-elect, wishing him as happy and successful a year of office as he, Mr. Royle, had enjoyed. He also welcomed Mr. W. Heckroodt, the vice-chairman of the South African Centre, who is at present in England examining British transport methods. Mr. Lamb, formerly the editor of *Modern Transport*, replied to the retiring president's speech and on behalf of all those present wished Mr. Royle good health in which to enjoy a long and happy retirement.

TRIPLETS: The new Merlin-powered version of the Boulton-Paul Balliol (Mark 2) is seen in the foreground, with the Balliol I (Mamba turbo-prop) and the Mercury-engined P.108 prototype. The Mark 2 displays the latest pattern of cockpit enclosure.

HERE AND THERE

New Merlin-powered Fighter

POWERED by two Rolls-Royce Merlin engines driving four-bladed contra rotating airscrews, a new interceptor and night fighter has been produced by the Argentine Secretaria de Aerotecnica, Cordoba; maximum speed of the new machine, which has already started flight trials, is expected to reach 437 m.p.h. The aircraft has been designed and developed by Senor Pallavicino of the Institute Aerotecnico using materials mostly produced in Argentina. The machine has a wing span of 49ft 3in, a total wing area of 364 sq ft and a fuselage length of 38ft 8in.

Tribute to the Nene

OUR American contemporary *Aero Digest* pays a graceful tribute to the Rolls-Royce Nene. The heading and sub-title to an article in the July issue are: "The Nene Passes with Honors"—"Only a remarkable jet engine could survive the gruelling tests imposed by the engineers at P. and W. Aircraft Division." Incidentally, the official American designation of the Nene is Pratt and Whitney J 42-P-8.

American Aid

HAVING been told that streptomicin might effect a cure for her husband who was dangerously ill, Mrs. F. George of Epsom, Surrey, tried in vain to obtain a supply of the drug and eventually appealed to the American Overseas Airlines for help. Mr. Jack Kerns, A.O.A. station manager, has now presented Mrs. George with 120 grams of the drug.

R.A.F. and R.N. at Lord's

THE inter-Services cricket match between the Royal Air Force and the Royal Navy, played at Lord's on July 23rd and 24th, ended in a draw. In the first innings the R.A.F. scored 216, largely aided by a brilliant 123 from F/O. Lunsdaine, the Scottish rugby international, and the Navy 227, F/L. A. C. Shirreff, the Hampshire county player, taking 5 wickets for 94. In their second innings the R.A.F. declared at 188 for 8—A/C. A. Rayment scoring 108, F/L. R. Murphy 38—leaving their opponents 178 to get to win. However, when the Navy had lost 8 wickets for 128 runs and victory for the R.A.F. was in sight, play was brought to a close.

THE SHAH AT ODIHAM: The Shah of Persia inspecting the cockpit of a Vampire at Odiham. Shortly after he left the R.A.F. station the Lockheed Shooting Stars arrived from America.

Display Organization

A VERY informative and valuable pamphlet dealing with the organization and control of air displays and flying meetings has been added to the helpful literature issued by the Royal Aero Club. Guidance on and the duties of control officers, provision of ground telecommunications apparatus, safety of persons and property, control of spectators, and airfield traffic control is given in a clear and comprehensive manner. The Appendices contain extracts from the Air Navigation (Consolidation) Order, 1923.

Housing at Bristol

BRISTOL Housing Committee has promised to assist in providing houses for B.O.A.C. employees who are being transferred from the maintenance base at Dorval, Montreal, to Filton, under the dollar-saving scheme. First key men arrive in October.

Bristol Post

MR. F. J. CHARD, who succeeds Mr. A. Latham as production manager for the Bristol Brabazon project, has been production manager of the experimental department since 1945. He joined Bristols in 1924, was appointed service manager in 1937 and became works manager (Aircraft Division) in 1941.

Mr. F. J. Chard

Russian Pioneering Claims

ACCORDING to the *Soviet News* documents have been discovered in the Leningrad archives which claim that the first flying machine was invented by Captain Alexander Mozhaisky in Russia 25 years before the Wright Brothers constructed their aircraft. It is said that the inventor devoted 35 years of his life to designing a heavier-than-air flying machine and received no assistance from the Czarist government, and all his experiments were conducted at his own expense. It is claimed that in 1881 his invention was patented, and that the aircraft took the form of a boat-shaped monoplane, the propellors of which were driven by a steam engine constructed by Mozhaisky himself. According to the documents discovered Mozhaisky designed ailerons for lateral control 30 years earlier than Farman, and his flying machine was constructed in 1882 in which year it succeeded in rising, but lost its balance.

Hawker Activities

EXPORT contracts to a value of £14 million were mentioned by the chairman, Mr. T. O. M. Sopwith, at the twelfth annual general meeting of the Hawker Siddeley Group, Ltd. A number of advanced military aircraft were being developed and a new four-engined

HERE AND THERE

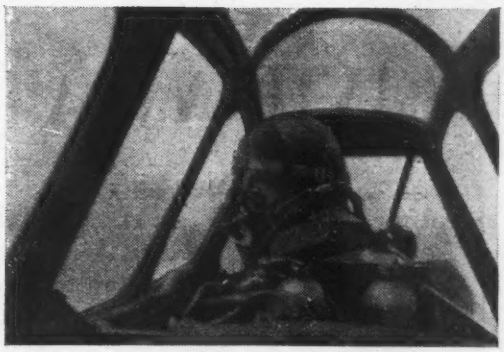
machine will shortly undergo initial flight tests. A. V. Roe Canada, Ltd., are building a new and interesting twin jet fighter, he said. On the civil side the Canadian firm has a new 30- to 40-seater four-jet machine under construction for inter-city operation in Canada. In this country the Armstrong Whitworth Aircraft Co. are constructing another advanced type of commercial transport, the Apollo, which will be powered by four Armstrong Siddeley Mamba gas turbines. Power plant projects include a pure jet unit which will soon be ready for development testing. The group now comprises twenty wholly owned companies, three partly owned and eleven subsidiary companies.

S. Africa Air Guide

A LIST of amendments to the recently issued United Kingdom to South Africa Air Touring Guide has been published by the Private Aviation Division of the F.A.I. The amendments are so arranged that no hand corrections to the guide are necessary, the new pages, and in some cases additions, being substituted for those in the original manual. The Air Touring Guide contains full information as to the obtaining of visas, customs and fuel *carnets*, currency regulations and the like, as well as a selection of routes to South Africa with comprehensive details of airfields and general facilities *en route*.

Bullet and Bird Proof

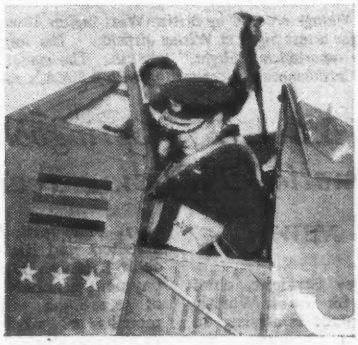
A PARTY of Royal Air Force pilots and technical officers recently visited the Triplex Safety Glass works at Birmingham to see the manufacture of bullet-proof glass used in pressurized Meteors and to discuss problems in connection with the high speed of this aircraft. One pilot mentioned that he brought his machine from 40,000ft on to the runway—involving a temperature change from minus 60 deg C to 20 deg C—in less than two minutes. In the manufacture of the bullet-proof glass this temperature change would take two hours to achieve. Special windscreens to withstand the impact of a 14-lb bird at 200 m.p.h. are also being produced by the Triplex company. These windscreens have been designed for export machines and British aircraft for service abroad.



A WISE HEAD: Squadron Leader Waterton, as seen by the occupant of the rear seat in the Gloster Meteor 7 Trainer. This intimate little study was secured during the recently completed Turkish demonstration tour by the world's fastest trainer.

Jet Component Testing

FOR the development of component parts for proposed U.S.A.F. jet-propelled helicopters new facilities have been established at the flight test centre of the General Electric Company, Schenectady. The first phase of the new project will include the testing of various types of power plant and components, with particular reference to the static testing of burners, and the second phase the power testing of burners in the new outdoor test pit.



THREE-STAR VINTAGE: Air Vice-Marshal J. N. Boothman (A.C.A.S. Technical Requirements) still uses a beloved "Spit" as a personal aircraft.

Electronics Exhibition

PROTOTYPE miniature high and low tension batteries developed by the Chloride Electrical Storage Co., Ltd., for use with the radio equipment installed in meteorological balloons were among the items displayed at the Electronics Exhibition at Manchester this week. Exide aircraft batteries for use in commercial machines were also on show.

LABOUR SAVING: The folding wings of this Firefly have been fitted with the first set of power-folding equipment developed and produced by the Fairey Aviation Company.

News in Brief

THE Busk Studentship in Aeronautics for 1948-49, referred to in *Flight*, April 15th, has been awarded by the trustees to Arthur John Cable of the Merchant Venturers' Technical College, Bristol University.

* * *

Mr. C. L. Yates, formerly Trans World Airline district manager at Toledo, has been appointed district manager in London in place of Mr. J. C. Stewart, who has now returned to the United States to take up another position there.

* * *

An aircraft about to take off from Indianapolis was delayed by the fact that too many passengers were found to be aboard. Apparently the machine was turned round so fast that two of the original passengers had not had time to get off!

* * *

Fifteen cartons of bread are being flown over every day from Los Angeles to American competitors in the Olympic games. The bread is flown to New York by American Airlines and thence by American Overseas Airlines to London.

* * *

Belief that America has now caught up with other countries in jet power development has been expressed by the Committee on Aeronautics of the U.S. Research and Development Board. But they still concede that British jet planes show a better fuel economy.

* * *

Capt. (E) M. Luby, R.N., for the past two years Director of Engine Research and Development in the Ministry of Supply, has retired from the Royal Navy with effect from July 6th. He will continue in his post with the Ministry in a civilian capacity.

* * *

Trans Australia Airlines has purchased six de Havilland Drovers. These all-metal six-passenger aircraft will be used to replace the Dragons and Ansons at present being flown on feeder and development routes in Queensland.

* * *

A B.O.A.C. Lancastrian freighter recently completed a "Zubes for Zulus" flight. Some 5,000,000 cough lozenges weighing about 3½ tons were flown in two consignments on the Springbok route to Johannesburg.

* * *

The transfer of the seaplane plant of Short Brothers and Harland, Ltd., from Rochester to Belfast—one of the largest industrial removal operations ever to be carried out in these islands—has now been completed.

CIVIL AVIATION NEWS

CARIBBEAN VIKING: The first of five Vickers Vikings ordered by British West Indian Airways to replace the Lodestars at present in service in the Caribbean area is here seen taxying out for a test flight at Wisley airfield. The registration of the new British West Indian Airways company, which is associated with B.S.A.A., was reported in "Flight," July 8th. The headquarters of this airline are situated in Trinidad and their network covers all the main routes in the Caribbean area, connecting with B.S.A.A.'s route to the United Kingdom at Kingston, Jamaica.

Sir F. Whittle Joins B.O.A.C. : Springbok Service Temporarily Suspended : International Gliding Teams in Switzerland

SIR FRANK WHITTLE'S NEW APPOINTMENT

LAST Thursday, July 22nd, Mr. Whitney Straight, chief executive of B.O.A.C., announced that Sir Frank Whittle had accepted an invitation from B.O.A.C. to act as adviser on the operation and development of gas turbine engines. Sir Frank's appointment, which for the time being is an honorary one, dates from July 21st. This important announcement will be regarded with great satisfaction by the Corporations and will be welcomed by everyone in the aircraft industry. An intensely important stage has been reached in the development of turbojet and turboprop power units for civil aircraft, and with the Vickers Viscount now flying, the Bristol 167 and D.H. 106 construction progressing rapidly, as also that of the S.R.45, the future of which is now assured, the timely acquisition of Sir Frank's experience will be of inestimable value.

SOUTH AFRICAN SOLENT SERVICE

B.O.A.C. are hoping that the Solent service to South Africa will soon be resumed when the trouble recently encountered with the wing floats has been rectified. Two Solents are at present undergoing tests at Belfast and until results of these investigations are available it is not possible to say when the Solents will be returned to service, but everything is being done to remedy the defect as quickly as possible. Until the service is restored B.O.A.C. are using Skymasters on this route in co-operation with South African Airways, and on July 26th a once-weekly service with Plymouth flying-boats was added. Mr. Whitney Straight on July 22nd discussed with the National Joint Council for Civil Air Transport the effect of the Corporation's staff reorganization resulting from the government's decision to purchase Canadair Four aircraft. Representatives of joint panel committees from all the B.O.A.C. bases in the U.K. were present and Mr. J. Young, general secretary of the Association of Engineering and Shipbuilding Draughtsmen, presided. Construction of the first of the 22 Canadair Four aircraft ordered by B.O.A.C. has already begun and is expected to keep the Canadair plant fully occupied for some time. There is confidence in the Canadian factory that the deliveries of aircraft can be made in the required time.

CLEARING HOUSE ACTIVITY

THE steadily increasing volume of international airline traffic was reflected during May in a record turnover of £2,118,500 worth of airline traffic transactions in the International Air Transport Association (I.A.T.A.) Clearing House. The highest previous monthly total since the Clearing House opened in January, 1947, was £1,975,000, registered during September, 1947. The turnover represents transactions between 24 airline members and the Clearing House. After adjusting credit and debit balances between members the sum to be settled by cash payment was only £243,250, or 11 per cent of the total volume of £2,118,500. Clearing House transactions for the first five months of 1948 totalled £8,350,000, as compared with £2,156,000 during the same period last year, when the institution had fewer members.

TOULON ACCIDENT

A B.O.A.C. Dakota, G-AGKN, carrying a crew of four, two passengers, and a quantity of cargo, crashed into a cliff on the French coast south-west of Toulon on July 14th, and fell on to the shore below. All the occupants lost their lives. The aircraft left Malta, where the two passengers embarked, at 04.30 hours G.M.T., and at 08.30 hours a signal was received at Marseilles that the E.T.A. was 08.48 hours. Nothing further was heard until news was received of the accident. Conflicting reports as to the weather prevailing have been received but it is probable that local fog or poor visibility may have contributed to the tragedy.

AUSTRALIA'S FARE WAR

WINTER fare concessions announced by Ansett Airways and Trans-Australia Airlines suggest another flare-up in the fare war carried on between Australian airlines since the government-owned T.A.A. was established. For the period June 1st to September 1st a 17 per cent cut in fares between Melbourne and Tasmania was announced by Ansett Airways, the reduction showing a saving of £1 1s 9d for the Melbourne-Hobart flight and 15s 6d from Melbourne to Launceston. Following this announcement T.A.A., who operate similar services, decided to reduce fares on all routes to and from Tasmania, their fares now being in line with those charged by Ansett Airways. No reductions are planned by Australian National Airways, however, the general manager, Mr. H. F. Walsh, stating that in view of increased costs there was nothing to warrant a reduction and that the reduced fares announced by T.A.A. would mean increased cost to the taxpayer.

BRITISH GLIDING TEAM

ALTHOUGH, on a number of occasions, rain hindered the practice of the British gliding team for the F.A.I. International Gliding Competitions which opened at Samaden on July 19th, nevertheless their practice total of 110 hours was far more than that achieved by any of the other competitors. On the first day of practice Charles Nicholson, flying a Gull IV, completed the flight to Davos and back in eleven

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minutes less than the time recorded by the winner of last year's contest, and that without the advantage of a flying start. Charles Wingfield was slightly ill with stomach trouble during the whole of the practice period and as this, coupled with the bad weather, prevented him putting in much flying he decided to stand down in favour of Mr. L. Welch. The reserve Weihe aircraft was brought in for Welch and no little difficulty was experienced in getting the machine serviceable. Led by "Pop" Kent, the team eventually got the reserve Weihe completed, but rain again prevented Welch from properly trying it out in the air; for the actual competition he is flying Wingfield's Olympia. During the practice the team had the advantage of being able to try out the Swiss S.19, Welch flying the machine for 6¼ hours. The countries, pilots and gliders competing at Samaden are as follows:—

Egypt: Ch. Weber,* H. Kamil (Air 100).

Spain: Renafiel,* Ara Torrell (Weihe), Juez Gomez (Kranich), Sevillano Perez (Weihe).

Finland: L. Poppius,* J. Haltiala (Meise), K. Temmes (Meise).

France: M. Marquenet,* R. Branciard (Air 100), R. Fonteilles (Nord 2000), H. Lambert (Air 100), Ch. Lethore (Nord 2000), L. Notteghem (Air 100), A. Valette (Air 100).

Great Britain: Mrs. A. C. Douglas,* R. Forbes (Weihe), P. Mallett (Weihe), C. Nicholson (Gull 4), L. Welch (Olympia), P. Wills (Gull 4), D. F. Greig (Olympia).

Italy: M. Ciani,* Padova (Arcore).

Poland: M. Weigl,* Adamski (Sep), Kasprzyk (Sep), Kempowna (Mucha), A. Ziemtek (Sep).

Sweden: L. Bunke,* A. Magnusson (Weihe), P. A. Persson (Weihe).

Switzerland: Ed. Lauber,* K. Fahrlander (WLM 1), R. Isler (WLM 1), A. Kuhn (Moswey 3), S. Maurer (Moswey 3), K. Ruckstuhl (Moswey 3), M. Schachenmann (Air 100).

Czechoslovakia: Ladislav Stejskal,* Ch. Dloughy (L-107/2), G. Forchtgott (Z-25), M. Hanslian (Z-25), L. Haza (Z-25), J. Glesk (Z-25), B. Rocek (L-107).

* Team captains.

BREVITIES

The first Mexican aircraft XA-GOQ to land at London Airport arrived on July 9th with members of the Olympic team on board.

* * *

The international air exhibition, which was to have been held in Copenhagen from October 15th-24th, has been cancelled. Foreign currency shortages and restrictions were stated to be the reason.

* * *

On July 13th a S.A.S. Skymaster made the company's 100th crossing of the North Atlantic. A regular daily service is flown from Stockholm through Copenhagen, Oslo and Prestwick to Gander and New York.

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In a written reply to a question in the House of Commons, Mr. G. S. Lindgren, Parliamentary Secretary to the Ministry of Civil Aviation, stated that the basis adopted for Exchequer grants to the three British airline corporations for 1947-8 was a block grant related to estimates presented by each corporation. He added that the actual amount of the grants, which had now been determined, were: B.O.A.C. £6,300,000, B.E.A. £3,400,000 and B.S.A.A. £260,000.

* * *

Supplementary services providing seats for approximately 2,500 additional passengers on the Paris-London route are being operated by Air France during the period of the Olympic Games between July 26th and August 16th. Languedoc 33-seaters are being used for a daily (Sundays excepted) return service in the forenoon, and for a four-weekly service in the afternoons. On August 9th DC-4s fitted with 55 seats will be used to operate morning and afternoon return flights.

The French prototype aircraft, the Cormoran 211, crashed on July 20th when about to land at Villacoublay. It was on its first flight, and had made a perfect take-off from Toussus-le-Noble. With an all-up weight of 40 tons, a wing span of 143ft, and powered by four engines, the Cormoran had been under construction for 18 months, and was one of the largest aircraft ever built in France. Twenty of the type had been ordered by the Army Air Staff. The crew of five lost their lives.

* * *

Figures published for 1947 show that during that year 285 accidents involving aircraft engaged in civil flying in Canada were recorded, an increase of 101 over the 1946 total. Five of the aircraft involved were of foreign registration. Of the accidents recorded 259 occurred during the day against only four at night. Local flying resulted in 86 accidents and cross-country flying 120; no accidents were reported in the case of machines engaged in instrument flying.

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Sir John Bennett, until recently Inspector General of Police, Punjab, has been appointed Chief Constable of the Ministry of Civil Aviation constabulary which is now being formed. The present arrangement, whereby the Air Ministry police M.C.A. airports and stores will cease. Major W. Ronnie, previously Chief Constable of Breconshire, has been appointed Deputy Chief Constable.

* * *

Capable of accommodating ten DC-6s or four Boeing Stratocruisers, a new hangar will be ready this summer at Bromma airport, Stockholm. Of welded steel frame construction the completed hangar will be approximately 492ft by 197ft and 46ft high, with a floor area of over 100,000 sq ft. Further hangars of a similar type are being planned.

* * *

The new Solents on order for Tasman Empire Airways, for delivery March, 1949, will have a cruising speed of 230 m.p.h. and capacity for 44 passengers, according to Mr. I. A. Scott, Acting Director of Civil Aviation in New Zealand. They would make six return trips a week, he said, to commence with, as against four trips by the existing flying-boats, though the service eventually would be stepped up to twelve return trips weekly.

* * *

Two more airfields are to be constructed in North Borneo in addition to the one at Labuan, according to a statement issued in Hong Kong by Messrs. Gibb, Livingston & Co., Ltd., agents for the Government of North Borneo. Tenders have been invited for the construction of airfields at Jesselton and Sandakan, and for rehabilitating the present 1,400-yard air strip at Labuan.

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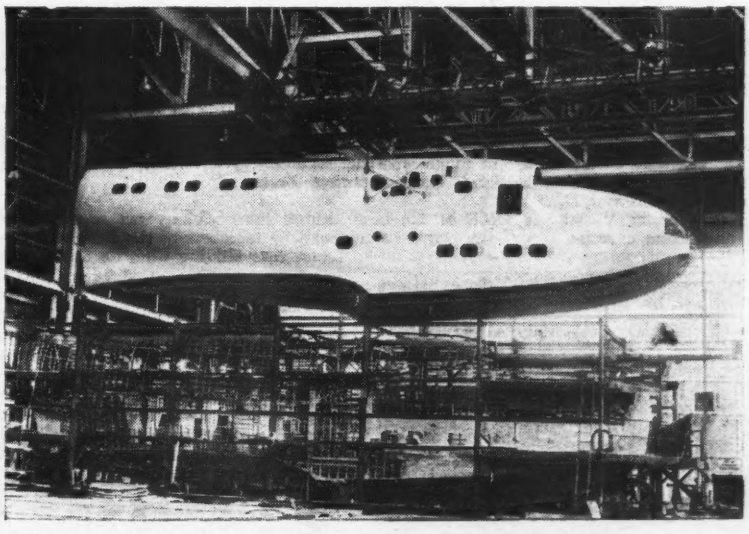
After eight months' experience of running flying-boat services from Biscarosse (Bordeaux) to Fort de France, Martinique, Air France have made modifications to the Latécoère 631 flying-boat. Instead of having 46 seats which



SOLENTS FOR T.E.A.: The first Short Solent under construction for Tasman Empire Airways, referred to on this page, being moved to the assembly line at the Belfast works of Short Brothers and Harland Ltd. A second hull nearing completion can be seen in the background.

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were all convertible into sleeping bunks and arranged in cabins for two or four passengers, the new flying-boats numbers 05 and 06 which were brought into service on June 15th have been converted to carry 54 passengers of whom only 30 would have sleeping bunks and the remainder normal seats in the centre portion of the aircraft. The 12 cabins each with two bunks are in the fore part of the aircraft and four cabins also each having two bunks lie aft. Although the company consider that this arrangement will cater for the two classes of traveller, the saloon and bar will be available to all passengers.

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A U.S. Senate Committee has asked experts to undertake the study of possible development and the operation of commercial airships costing between £2½ and £5 million each and capable of carrying hundreds of passengers and large tonnages of freight.

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Probably the highest frequency air service on any route in Europe is that between Copenhagen and the Swedish port of Malmö, a distance of 25 kilometres. S.A.S. operate 26 scheduled flights a day with 28 on Sundays.

* * *

Mr. Theodore Wright, former head of the U.S. Civil Aeronautics Administration, and now in charge of research at Cornell University, has predicted that by 1955 there will be 400,000 aircraft and 7,000 airports in use in the United States. This, he said, compared with 100,000 aircraft and 5,800 airports at present in use. Mr. Wright also predicted that the number of pilots would increase from 500,000 to 1,000,000 within this period, and that route mileages on regular services would increase from 8,500,000,000 miles to a total of 15,000,000,000 miles.

M.Ps. AND AN AMBASSADOR: Mr. A. Lennox-Boyd (right) Chairman of the Conservative Civil Aviation Committee, recently flew from Hatfield to Christchurch with some members of the Committee. They inspected the prototype Ambassador in which this photograph was taken. Left to right are: Col. F. J. Errol, M.P., G/C. The Hon. G. Ward, M.P., Sir W. Wakefield, M.P., Mr. P. Bremridge and Maj. R. J. E. Conant, M.P.

FROM THE CLUBS

THE programme and date for the Thruxton Air Races arranged by the Wiltshire School of Flying, details of which were published in *Flight*, July 15th, have had to be altered owing to transport and other difficulties. The Races will now be held on August 15th, instead of August 21st, and will begin at 10 a.m. instead of at 2 p.m. as previously intended. The order of events is expected to remain unchanged, although original timings may not be adhered to.

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IN contrast to the attitude of our own Government the Canadian Transport Minister, Mr. Lionel Cheonier, has announced that the Federal Government may increase its financial assistance to the flying clubs across Canada. The present grant of $5,000 provided for in the regular 1948-49 estimates was, he agreed, insufficient to meet the needs of the clubs. When the question of grants was raised in the Canadian House of Commons, Mr. Gordon Graydon, M.P., said that the clubs had played a vital role both in war and peace and were of great value to the country's security.

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THE Royal Aeronautical Society, Brough Branch, in co-operation with the Brough Flying Club, will hold a competition for the Cirrus Trophy at Brough Airfield on August 21st. Open to standard Auster aircraft with Cirrus Minor II engines, the competition will take place only under Visual Flight Rules and will take the form of a navigation exercise. Marks will be awarded for petrol used and the speed obtained over a given route. Entries are at the rate of £1 1s per aircraft, and should be sent to Mr. P. G. Lawrence, Blackburn Aircraft, Ltd., Brough, E. Yorks, by July 31st.

* * *

AT Fairoaks recently the first social evening was held since the return of the basic petrol ration. This function was extremely well attended, the guests numbering approximately 150, as compared with parties held during the period of restriction of private motoring, which usually failed to exceed 50 in number. Catering facilities were operated to capacity and since the weather was, fortunately, fine, the party overflowed on to the lawn where refreshments were served.

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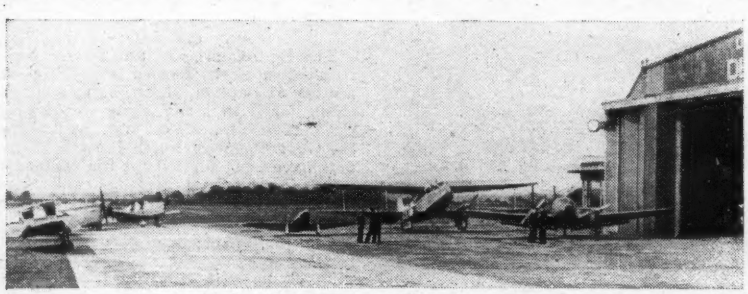
THE Community Flying Club, which operates from Woodley airfield, Reading, at week-ends hopes shortly to have the use of a further aircraft and will therefore be able to welcome fresh members who wish to fly as cheaply as possible. They have been unable to keep to their original rates but, for a £10 or £20 deposit members can fly at £1 15s and £1 5s per hour respectively. Those who may be interested in joining the club should get in touch with the secretary, Mr. Clifford B. Allen, at 66, Redlands Road, Reading, Berks.

* * *

SOME of the best heights since gliding was resumed after the war were achieved by members of the Derbyshire and Lancashire Gliding Club at their recent one-week meeting at Great Hucklow. One of the best flights of the week was made by Mr. J. R. Robertson, of Wolverhampton. Leaving the club ground at 12.45 p.m. he landed five hours later at the West Herts Golf Club, Watford—a distance of 126 miles. Within a few minutes of launching Mr. Robertson reached a height of 5,000ft, although from Leicester onwards he had difficulty in maintaining 1,000ft due to moderating conditions. During the meeting Miss Leslie Benson, daughter of the Member of Parliament for Chesterfield, reached a height of 2,200ft in a trainer, the first time this feat has been accomplished at Great Hucklow, where the launching ground is in good condition.



THE TARMAC AT DERBY: Part of the Derby Aero Club's fleet photographed at Burnaston Municipal Airport. The Club is associated with the Wolverhampton club of which a photograph appeared in the preceding issue of "Flight".

FIGHTER FLYING BOAT

Description in Detail of the Saunders-Roe A1 Twin-Jet Design : Internally-Mounted Metrovick Beryls

THERE is no doubt that the Saunders-Roe twin-jet single-seater fighter flying boat is one of the most interesting and unusual designs ever to take the air. On close inspection one becomes more and more intrigued as the various details of equipment and construction are revealed. In particular, however, the overall impression gained is one of uniqueness, so different in shape, layout and conception is the S.R/A1 from all other fighters or aircraft of any other class. One feels impelled to liken the aircraft to a submarine and to pursue the comparison through the various major units. The hull is a floating powerhouse from which protrudes a pair of jet pipes. If one descends through the hatch and stands at the rear end of the walkway the scene ahead past the Metrovick power units gives, as may be judged from the illustration, a decidedly more nautical than aeronautical impression. The captain, or pilot, controls his ship from a tiny isolated cockpit unit on the top side, which is sealed off from the hull. It would be uncomfortably hot and noisy to ride in the engine-room, but space would permit the carriage in flight of first and second engineers. Moreover, the engines would be accessible to them in flight.

The requirements of the specification and the particular qualities demanded of a water-based fighter may be well known. The principal advantages of the "A1," the design of which was laid down in anticipation of a prolonged campaign to dislodge the Japanese from their Far East positions, is its ability to operate in areas where practically no land bases or landing strips are available. In this connection also it must be borne in mind that a sheltered stretch of water, which is all that is needed, requires practically no camouflage and can hardly be bombed out of use. What is more, the range problem associated with jet fighters can be, to some extent, alleviated by moving up and selecting bases as near as possible to the scene of operations. An emergency landing, due to loss of fuel or position, would with a land-based machine almost certainly result in a write-off. This is not necessarily so with a boat.

(Left to right) Saunders-Roe chief designer, Mr. H. Knowler, Metropolitan-Vickers chief gas turbine engineer, Dr. D. M. Smith and chief test pilot, Mr. Geoffrey Tyson.

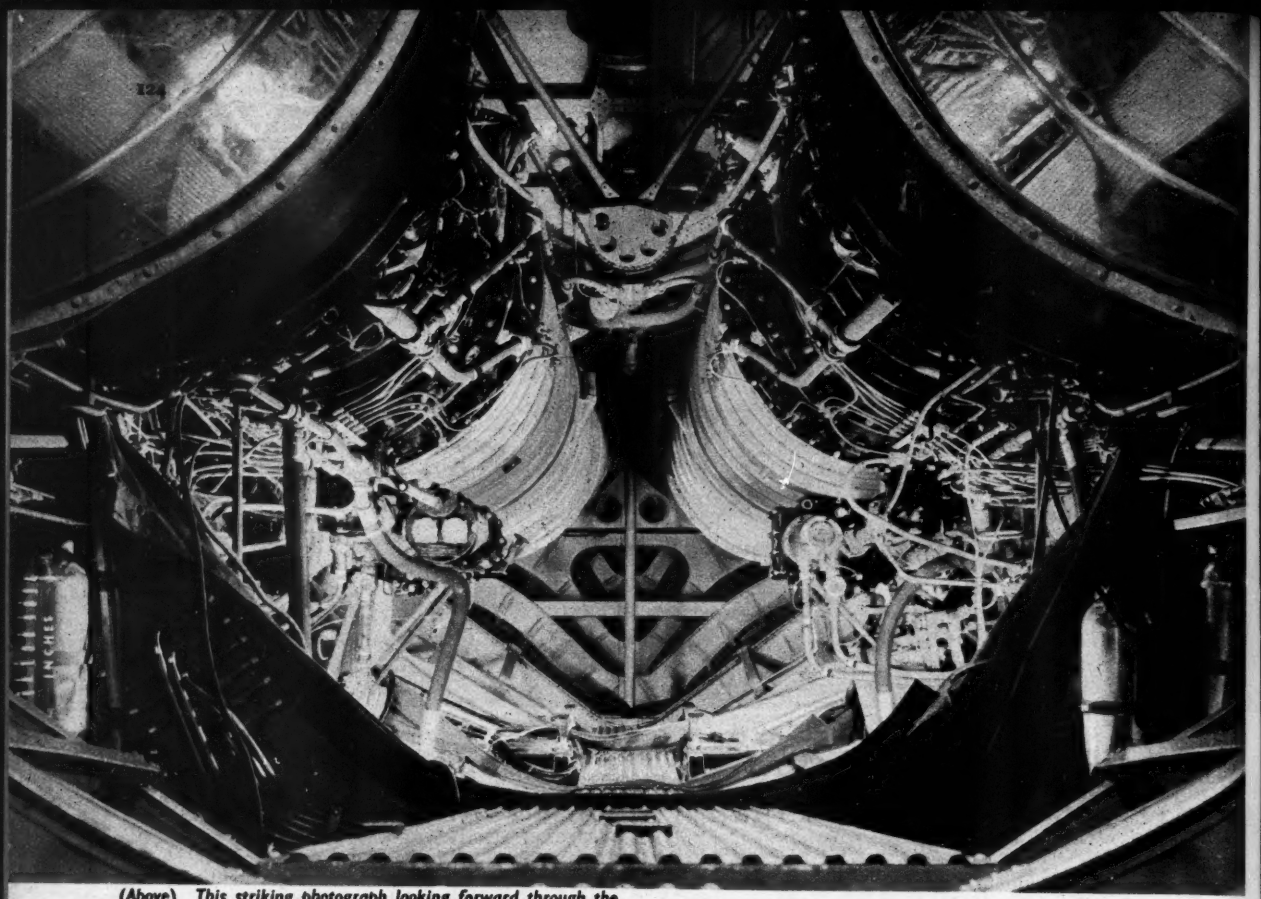
The S.R/A1 still has important applications and a bearing on future developments. There is a tendency now to carry a crew of two for long and medium-range work over difficult country. The S.R/A1, or a slightly larger version, might well carry a navigator, be equipped with additional fuel tankage and perhaps more powerful turbojets. At present fuel is carried only in the wings, but there is plenty of space available for tanks in the hull. The possibility of cruising on one turbojet, having reached operational height, should also be borne in mind.

Three S.R/A1s, to specification E.6/44, have now been completed and the first is undergoing trials at Felixstowe. The second is flying from Cowes, and the third, which differs in certain details, is being prepared there for demonstration at Farnborough. The first two prototypes have Metrovick F.2/4 turbojets rated at 3,500 lb thrust, but the third has later Beryls rated at 3,850 lb thrust.

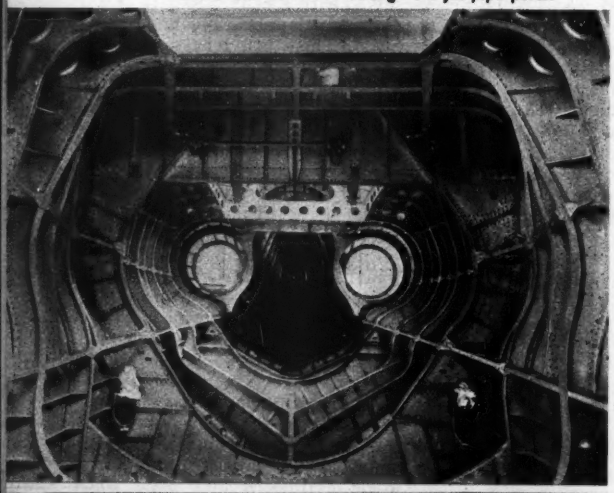
The airframe structure, except for the rather unusual shape of some main frames, in particular those of cloverleaf form around the jet pipe outlets, is quite conventional. Major units are mainly built up from angle extrusions and plate webs. The webs, or diaphragms as they are called locally, are, where necessary, stiffened with vertical angle sections or by flutes. Lighter frames and ribs may be either of similar construction with rolled angles, or one-piece pressings.

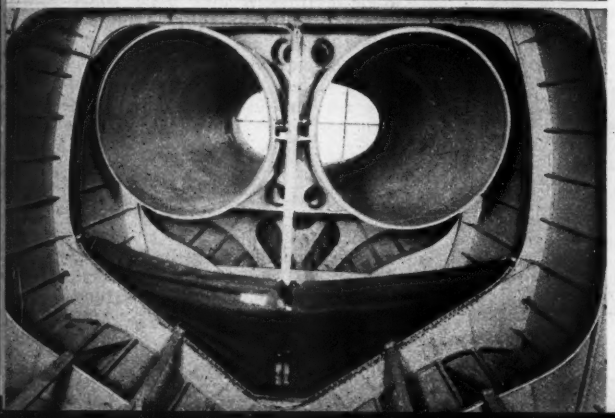
The Hull

From bow to stern there are 34 frames and through the centre portion seven half-frames in addition. These are intersected by deep channel-section longerons, extend-



(Above) This striking photograph looking forward through the engine room of the S.R./A1 serves to illustrate height, layout and details of power plant and accessories. Note the scale on the portside bottle. (Below) Unusual views forward through the snout and rearwards through the jet pipe ports.





FIGHTER FLYING BOAT...

ing from the gun deck (frame 8) to the jet outlet (frame 19), two on each side at hip and shoulder height, also by the keelson. The frames are tied in addition by horizontal intercostals at frequent intervals. The lesser stringers are lipped angles or, in the hull bottom, lipped Z-sections. The main frames themselves comprise extruded T- or angle-edge sections known, according to position, as shell, inner and bottom boundary bars, riveted to diaphragms stiffened as required.

The main wing spar is bolted to frame number 14, the principal hull frame. This also carries the rear engine mounting castings. The rear subsidiary wing spar corresponds with number 18 frame, and the step angle falls between frames 15 and 16. Other important positions are frames 8 to 12, between which is carried the pressurized cockpit unit immediately aft of the gun compartments, and frames 4, 8, 10, 14, 20 and 23, which form the watertight bulkheads. Impregnated fire-proof canvas partitions, unzipped to permit passage along the walkway, are also provided.

There is a main hatch between the wing spar frames, in the centre section through which the engines and other equipment are introduced or withdrawn, and let into it is a much smaller quickly detachable hatch to give access for servicing. The ladder inside is a permanent fitment.

The keelson comprises, spar-like, a T-section extruded top boom, stiffened plate web and back-to-back V angles at the lower edge. Outside is the keel strip and around the nose a light alloy rubbing strip, plug-riveted on.

In the upper part of the hull, sturdy built-up spars, known as carling members converge from the No. 14 frame near the outer shell forward to No. 12 frame. Here, junctions are made with, on the one side, the apex of the front engine mounting and the inter-spar struts, and on the other, the gunwale members which support the cockpit unit. Rear gunwale members with two transverse spars form the framework for the main hatch which is normally bolted down.

Ahead of the cockpit in the upper portion of the hull is a gun-bay and gun platform supporting four 20-mm cannon which

fire out over the bow. At present the automatic observers are mounted here.

Mainplanes

In the absence of wing-mounted power units and a separate centre section the mainplanes comprise simply two outer sections and two wing tips. They are built around a central main spar and a subsidiary rear spar. The spar booms are, of course, extended through the fuselage centre section as solid—almost square-section—extrusions, bolted to the tops of the corresponding frames. The root fittings on upper and lower spar booms are of the tongue and fork type, and each has reinforcement plates on the sides of the joint. An interesting expanding-type bolt assembly with solid conical bush and split sleeve passing through the fittings (see illustration) is employed for these root joints. In addition, a series of boundary bolts around the skin take torsional loads. Ahead of the spar in the mainplanes are the integral fuel tanks, each of 212 gallons capacity. They are divided into sections separated by non-return valves, and the wing ribs serve as baffles. Sealing is by means of Neoprene sheeting. The rib sections on both sides of the main spar (30 ribs in all) are conventional flanged pressings, and the nose ribs are cut back to avoid skin seating difficulties.

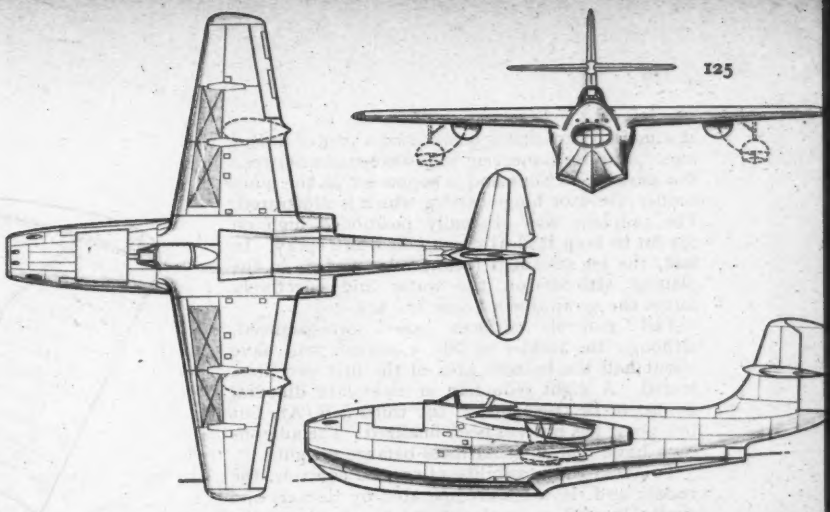
Equipment carried on or in the wings includes float retracting mechanism, air brakes, dive recovery brakes, landing flaps, bomb crutching, R.P., and drop tank fittings. Hydraulic services are employed and there is an air bottle emergency system.

The floats fold inwards, rotating also through 90 deg. about their fore and aft axes as they retract. When locked up they are positioned keel uppermost and resemble a very small drop tank. The dive-recovery surfaces are of small area and comprise heavy section plates supported on hinges and operated by a torque tube through three turnbuckle attachments each. Like the dive brakes they are hydraulically operated, but electrically controlled. The dive or air brakes take the form of split surfaces interconnected with the landing flaps. The upper surface is of similar area to the lower, and should flap be selected down when the brakes are open, the angle of the lower surface is simply increased. Maximum movement for application of brake is 30 deg. up and down, while maximum flap angle is 75 deg. down.

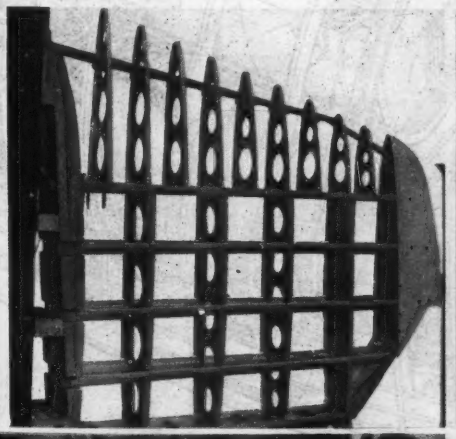
The tail surfaces and controls are all of similar construction. The tailplane spar is a small replica of the main wing spar. Ribs for all the units are flanged lightened pressings and spanwise stringers of Z-section are slotted into them. There are twice as many nose ribs as main ribs.

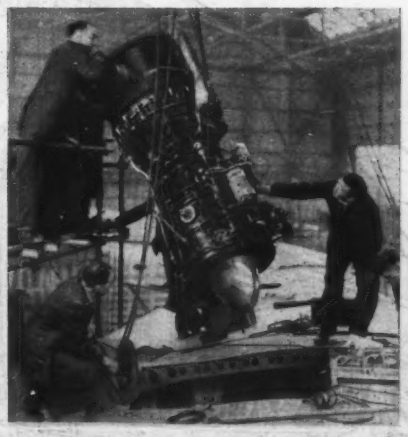
Controls carry separate geared trimming and spring tabs, these being mounted in each case on "boundary bars."

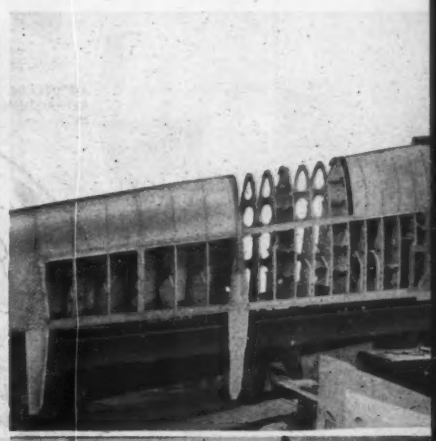
For convenience of manufacture the rudder is designed in two parts, but it is assembled as a unit, the fairing between the elevators fitting into a vee slot between the upper and lower sections. There is also a heavy interconnecting tube. The rudder is hinged top and bottom and



(Below, left) Structure of the fin, which is typical of the tail surfaces, and beneath it details of the keelson and frames. (Centre) The introduction of the power units through the main hatch between wing-spar frames calls for some ingenuity. Below is the No. 14 main fuselage and wing-spar frame. (Right) The portion of the wing forward of the spar, containing integral fuel tanks, and (below) an elevator/rudder casting.







at a main centre fitting comprising a pair of forked lugs. An interconnecting tube also passes between the elevator sections and is supported at the main rudder/elevator hinge casting which is illustrated. The tailplane was originally positioned high on the fin to keep it clear of jet efflux and spray. In fact, the jet stream is inclined downwards in the planing attitude on the water and effectively forces the spray down below the tail.

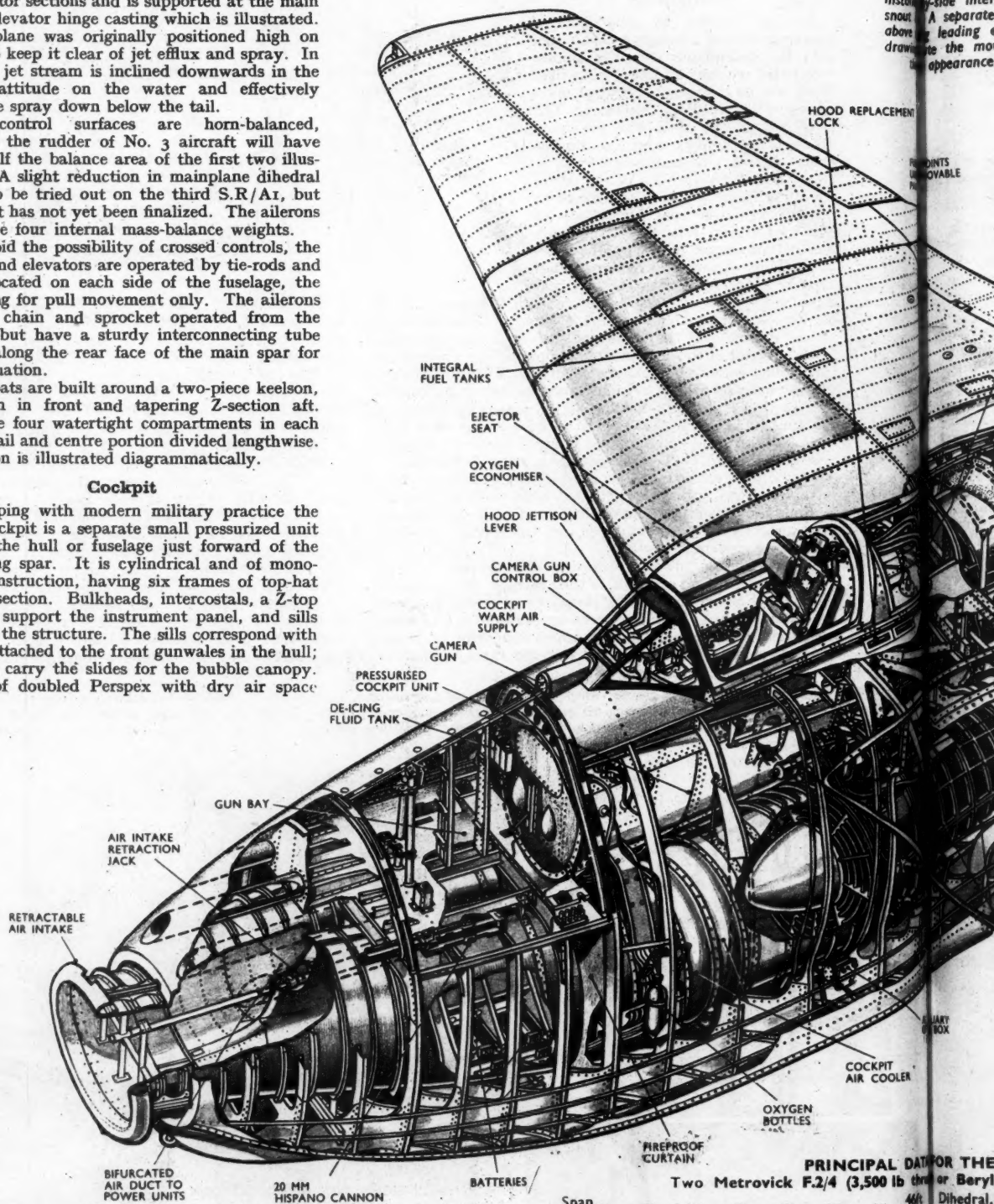
Tail control surfaces are horn-balanced, although the rudder of No. 3 aircraft will have about half the balance area of the first two illustrated. A slight reduction in mainplane dihedral is also to be tried out on the third S.R/A1, but this point has not yet been finalized. The ailerons each have four internal mass-balance weights.

To avoid the possibility of crossed controls, the rudder and elevators are operated by tie-rods and chains located on each side of the fuselage, the rods being for pull movement only. The ailerons are also chain and sprocket operated from the cockpit, but have a sturdy interconnecting tube located along the rear face of the main spar for final actuation.

The floats are built around a two-piece keelson, box form in front and tapering Z-section aft. There are four watertight compartments in each —nose, tail and centre portion divided lengthwise. Retraction is illustrated diagrammatically.

Cockpit

In keeping with modern military practice the pilot's cockpit is a separate small pressurized unit let into the hull or fuselage just forward of the main wing spar. It is cylindrical and of monocoque construction, having six frames of top-hat or angle section. Bulkheads, intercostals, a Z-top frame to support the instrument panel, and sills complete the structure. The sills correspond with and are attached to the front gunwales in the hull; they also carry the slides for the bubble canopy. This is of doubled Perspex with dry air space

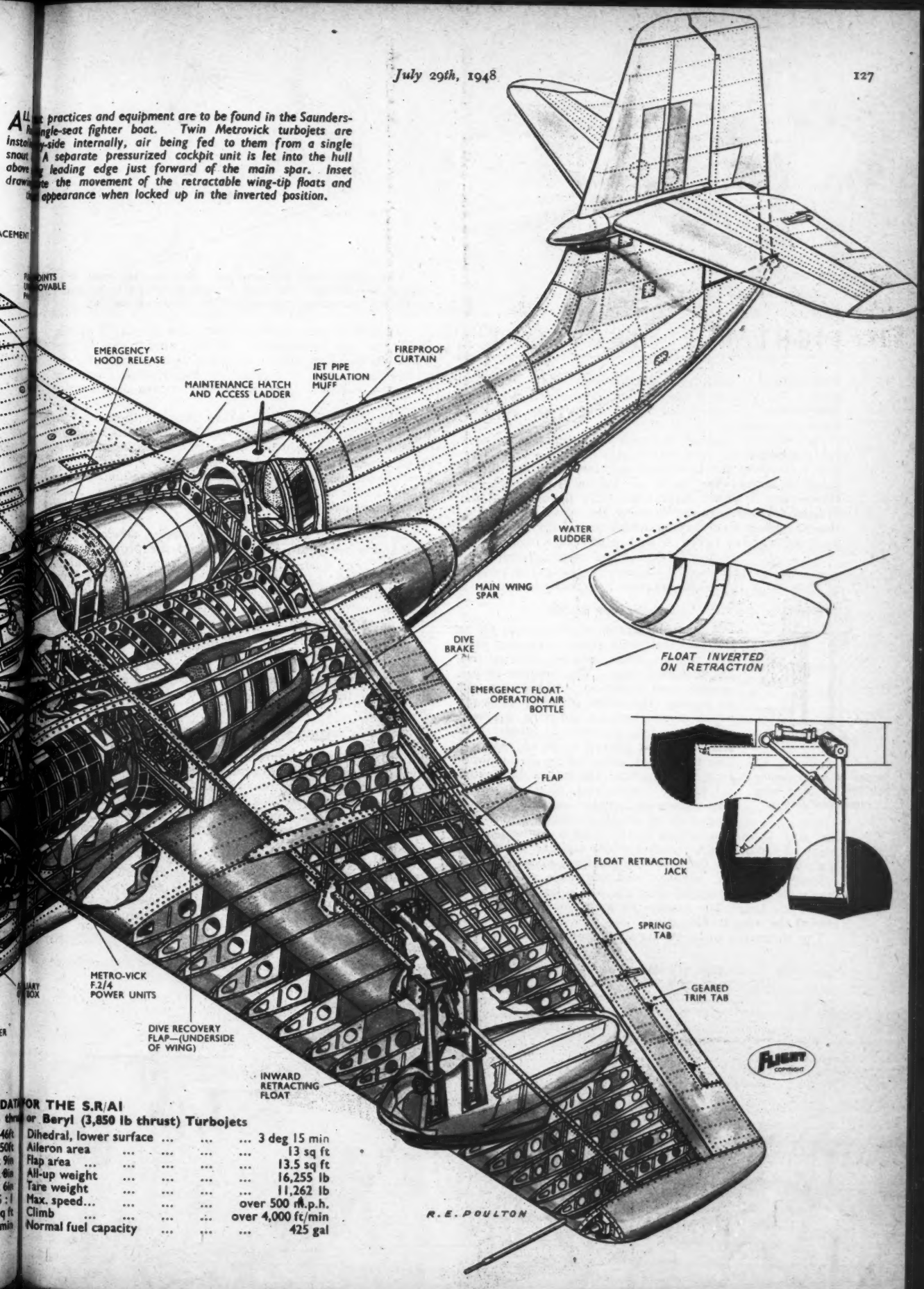


FIGHTER FLYING BOAT . . .

PRINCIPAL DATA FOR THE Two Metrovick F.2/4 (3,500 lb thrust Beryl

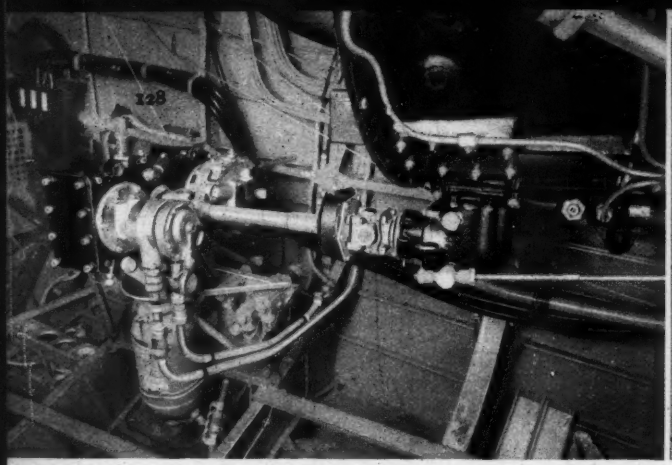
Span	46ft
Length	50ft
Height	16ft 9in
Root chord (Rib 1)	11ft 6in
Tip chord (Rib 30)	5ft 6in
Aspect ratio	5 : 1
Mainplane area	415 sq ft
Incidence	4 deg 30 min
Dihedral,	
Aileron a	
Flap area	
All-up we	
Tare weig	
Max. spee	
Climb	
Normal f	

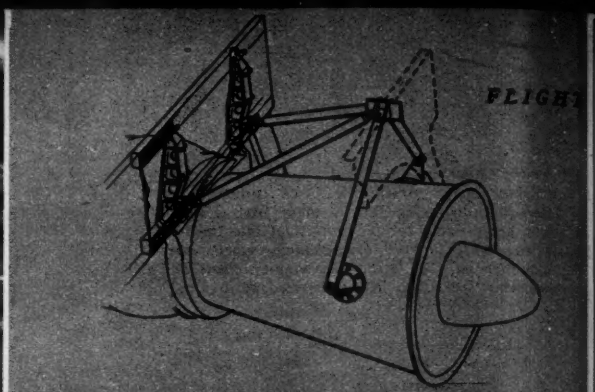
All-up practices and equipment are to be found in the Saunders-Roe single-seat fighter boat. Twin Metrovick turbojets are installed side-by-side internally, air being fed to them from a single snout intake. A separate pressurized cockpit unit is let into the hull above the leading edge just forward of the main spar. Inset drawings illustrate the movement of the retractable wing-tip floats and their appearance when locked up in the inverted position.



FOR THE S.R/A1
or Beryl (3,850 lb thrust) Turbojets

Dihedral, lower surface	3 deg 15 min
Aileron area	13 sq ft
Flap area	13.5 sq ft
All-up weight	16,255 lb
Tare weight	11,262 lb
Max. speed...	over 500 m.p.h.
Climb	over 4,000 ft/min
Normal fuel capacity	425 gal



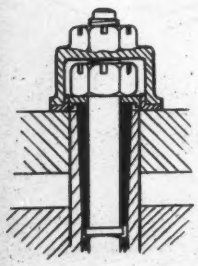


(Left) One of the remote accessory gear boxes mounted below and forward of the power unit. The main air-intake duct has been removed. (Right) Supporting structure for the Metrovick Beryls.

FIGHTER FLYING BOAT...

between and is used in conjunction with Dunlop inflatable seals. The canopy is electrically operated. The cockpit components are assembled wet, using marine glue as a sealing compound.

Hot air is tapped off the engine compressors for cockpit pressurization, and after some initial cooling is fed either direct to the cockpit or still further cooled by circulation around the main air intakes before delivery. The system is shown diagrammatically (below right). A Westland valve is preset to bring the system into operation at 9,000ft, and malfunctioning or leakage is indicated by a red warning light. A Vickers governor regulates the airflow. Equivalent cabin pressures are 15,000ft altitude—11,500ft in cabin; 25,000ft—15,000ft; 40,000ft—22,250ft.



Section of an expanding bolt for the main wing attachment fittings.

Power Units

A large bifurcated duct supplies air to the two Metrovick power units and is in five sections, each carrying angle or top-hat stiffening rings. The common intake, roughly oval in section, is in the nose, and to prevent the entry of spray or water which might climb up the prow, a power-operated extensible snout is fitted. This has not so far proved to be an essential. The movement, actuated by an hydraulic jack, is ten inches. The intake duct enters a "trouser" piece and, after bifurcation and change to circular section, continues rearwards at shoulder height against the hull shell to the compressor intake of each engine. At the point of separation a sturdy tubular upright is provided both to steady the duct and the gun deck above.

Short jet pipes, slightly toed outwards and carrying insulating muffs, protrude from the hull sides as they taper off to the tail. The nozzles lie approximately four feet behind the wing trailing edge.

The Metrovick turbojets are slung from numbers 12 and 14 frames. At the front end there are tubular V-struts, and at the rear mounting lugs attach direct to cast fittings bolted to the rear face of the main frame. Between the frames there are also pairs of converging struts extending from the castings forward to the apexes of the front supports.

Below and in front of the power units are their separate Rotol auxiliary gear boxes driven through shafts from the front of the compressor intake casing. Mountings are provided for Pesco vacuum pumps, generator, a Dowty "live line" hydraulic pump, etc. A single four-gallon oil tank mounted on a saddle bracket supplies both engines. Each unit has a small airscoop in the hull beneath the wing for cooling air for the bearings.

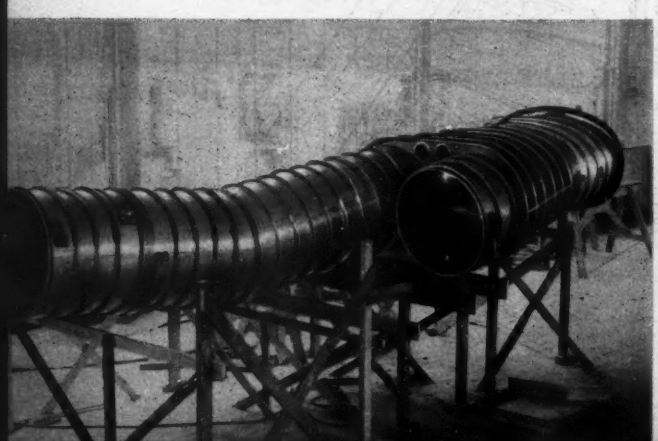
The location of the turbines, accessories, services, controls and other units in the hull, and the provision elsewhere of neat flush-fitting inspection panels has resulted in an aircraft, particularly accessible for servicing and maintenance. Two 12-v. accumulators are mounted as standard equipment beneath the port engine near to the main electrical panel, but extra ones are carried in a forward compartment when electric starting is used.

A Martin-Baker ejector seat is fitted, and, in addition, other devices now expected on high-speed aircraft, such as two-position rudder bars (knees up for dives), pressure air supply for anti-g suit, and power-operated cockpit enclosure.

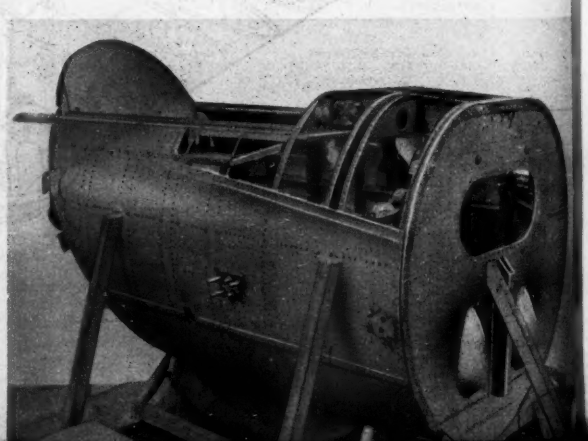
Handling on the Water

A great deal of thought has been given by the Saunders-Roe company to the subject of handling and mooring of flying boats before take-off and after landing. The S.R/A1 has an automatic nose pick-up hook on the keel below the water line, also a rubbing strip already mentioned. It is intended that the aircraft shall be taxied between markers (probably on the points of a star buoy) between which is stretched a cable. After engagement of the pick-up hook and its locking panel the buoy and boat are pulled into the pontoon or dock. At the tail there is another hook and catch, resembling a bomb slip, which is used for towing, mooring or beaching, or for streaming a drogue. Both catches can be released by the pilot from his cockpit.

Nose section, trouser piece and separate extension ducts make up the air-intake assembly for the two Beryls.



The pressurized cockpit unit in which will be installed a Martin-Baker ejector seat.



Mr. Geoffrey Tyson was the pilot of the S.R./A1 when this fine over-cloud study was secured. One of the four 20 mm cannon ports is seen above the bows. The aircraft is capable of a speed of more than 500 m.p.h.

Taxying has so far presented no problem and control in cross-winds with the aid of the water rudder is good. The jets have practically no differential effect, and with both turbines idling the taxying speed is about 5 kt. It is possible to taxy on one only in order to halve the thrust and minimum speed. The water rudder is interconnected with the main rudder, but can be released from the cockpit. It is cable-operated from the tie-rods of the main controls.

One man can attach the units of the landing chassis, which have a vertical bolt for insertion in a socket under the wing root and two fittings for insertion in slots just above the chines. They are designed to float vertically and at the correct depth, six gallons of fresh water being poured into each tyre of the twin-wheel units to give the correct buoyancy.

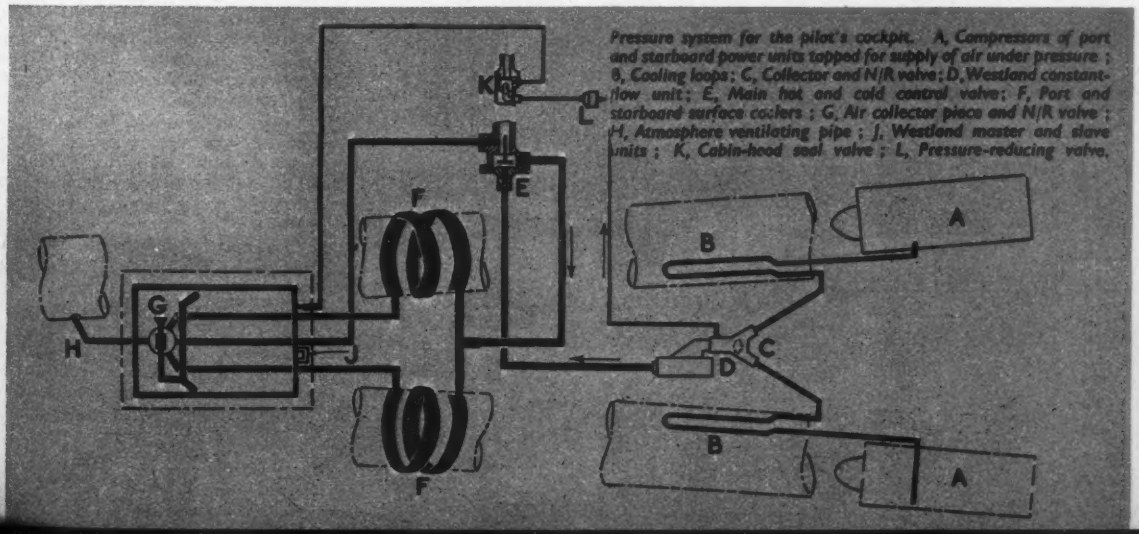
Development Progress

Flight development to date has been rather slow but nevertheless satisfactory. Most hours have naturally been completed in the No. 1 prototype which has now been flying for exactly two weeks over a year (first flight July 16th, 1947) and is now at Felixstowe. Full performance figures have not yet been established, but it can be estimated that top speed with the lower rated F.2/48 is about 500 m.p.h., and climb is not less than 4,000 ft/min. An additional 700 lb of thrust from the Beryls in No. 3 boat should improve this performance appreciably. Investigation of tip stall characteristics has led to the temporary artificial thickening of the outer portion of the wing on aircraft number two. Boats should never be stalled-on, however, so this quality is not of as great importance as it would be on a landplane. A mild tendency to snake at high speed is also being tackled and the reduced horn balance on the rudder is one result.

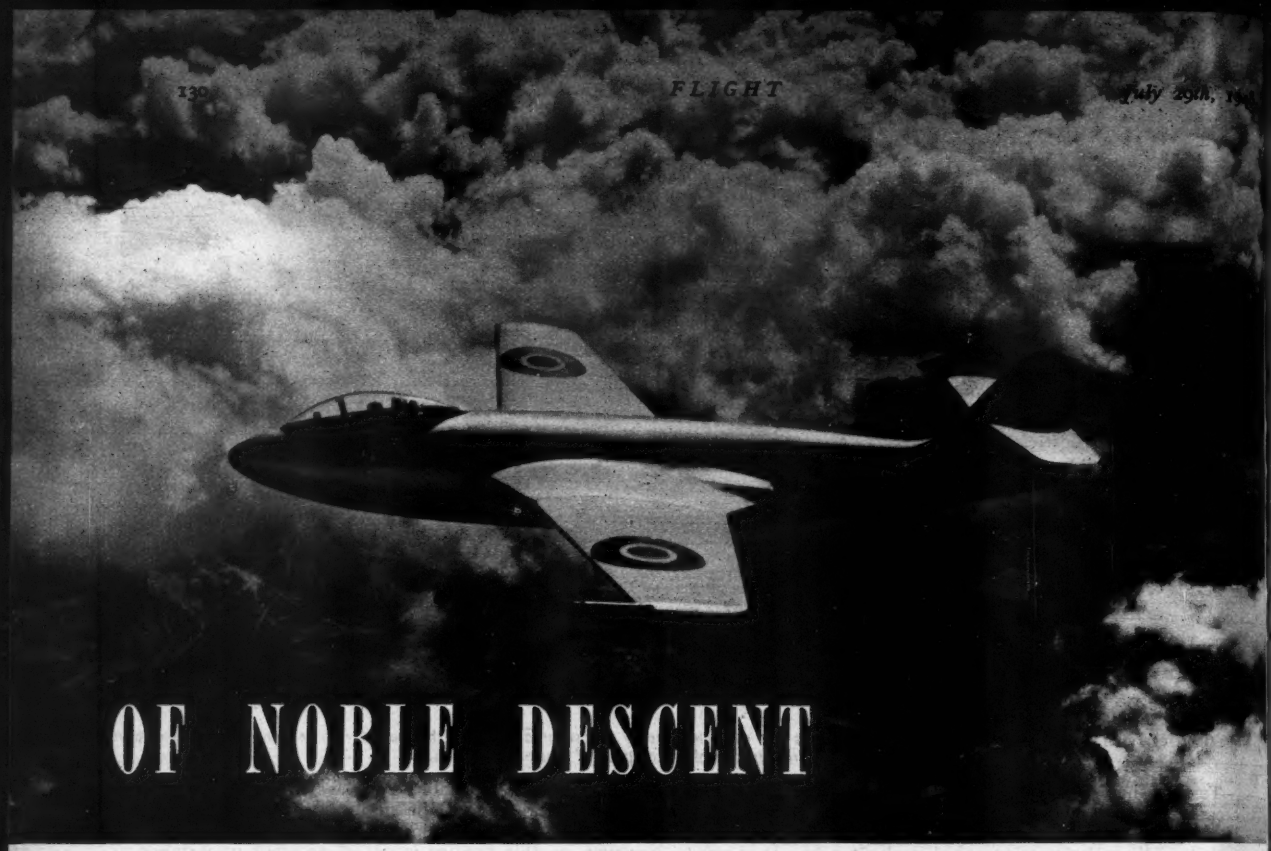
Fuel delivery pumps are now fitted in addition to the pressure system from vacuum pump exhaust to the fuel tanks. The normal tank capacity allows for 2 minutes at take-off power; climb to an operational height of 30,000ft; one hour's economical cruising at that height using 40 per cent thrust, 15 minutes' combat and a reserve of 10 per cent. Drop tanks of 140 gallons capacity each would double the cruising range given above.

This unique and advanced fighter equipped with well-tried axial-flow turbojets should be of great interest to countries with long irregular coastlines and rugged countryside such as the Scandinavian group, and in particular to others like the Dutch with scattered and partially-developed island colonies to patrol. This country is fortunate not to need the S.R/A1s operational services at the present time, but it will nevertheless profit greatly from experience gained with it.

When development is more advanced next year it would be well worth while setting up some Class C.2 records which are at present held on long standing by Italy. M. A. S.



Pressure system for the pilot's cockpit. A, Compressors of port and starboard power units tapped for supply of air under pressure; B, Cooling loops; C, Collector and N/R valve; D, Westland constant-flow unit; E, Main hot and cold control valve; F, Port and starboard surface coolers; G, Air collector piece and N/R valve; H, Atmosphere ventilating pipe; J, Westland master and slave units; K, Cabin-hood seal valve; L, Pressure-reducing valve.



OF NOBLE DESCENT

First Photographs of the Hawker N. 7/46 Nene-Powered Fighter

IF aircraft have personalities, the dainty Hawker Fury biplane of nearly twenty years ago and the war-scarred, but triumphant, Hurricane and Typhoon must be smiling approval from the Valhalla of great warplanes on the N. 7/46 jet fighter. For a year or more, the existence of this most modern Hawker type has been common knowledge and features of its design—notably the bifurcated jet outlet—have been the subject of discussion and conjecture all over the world. Only now, however, is it possible to publish photographs of this notable machine and to quote dimensions.

The photographs herewith, secured by Mr. Cyril Peckham, show the extremely clean lines of the aircraft and the excellent view from the cockpit (occupied in this instance by Mr. T. S. Wade, recently appointed Hawker chief test pilot). Also visible are the wing root air intakes for the single Rolls-Royce Nene turbojet, of 5,000 lb. static thrust, and the Hawker patent bifurcated trunk, which enables the exhaust to be discharged at corresponding positions in the trailing edge instead of through one central outlet in the extreme tail of the fuselage. This arrangement is likely to allow more room than is usual in a single-jet fighter for internal fuel tanks and providing greater range—a requirement of prime importance considering that the N. 7/46, in its present form at least, is intended for naval operation. It is likely, in fact, that the new fighter is able to fly faster and farther than any other single-jet fighter built to a comparable specification. Tests so far conducted by the Hawker flying staff and by Service establishments indicate that the handling characteristics are well up to the standard set by previous Hawker fighters. No precise figures for performances may yet be quoted, but a maximum speed of well over 600 m.p.h. may be confidently expected. In view of the requirements of the naval specification, which calls for folding wings and deck-landing gear, the machine is a real credit to Mr. Sydney Camm and the Hawker design office.

The elegant "N.7" on a recent test flight near Langley.

Dimensionally the N. 7/46 is relatively small and, like a number of other modern high-speed aircraft, has a length (38 ft 4 in) greater than its span (36 ft 6 in). Despite the modernity of the design there is an unmistakable "Hawker" air about the machine, arising principally from the shape of the vertical tail surfaces and from the straight-tapered wing, with its rounded tips.

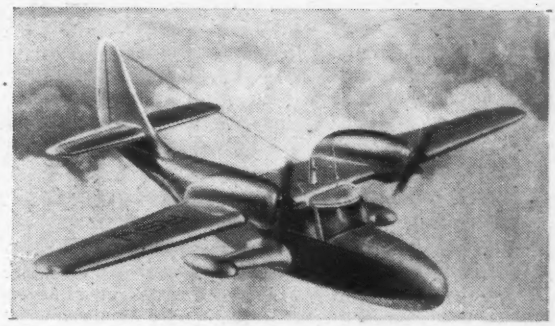
THE SPONSON "TRIBIAN"

A Small Amphibian of Very Clean Design

THE amphibian type of aircraft has intrigued and puzzled designers almost from the earliest days of flying. Many attempts have been made in Europe and America to combine the landplane and the seaplane in one machine. It is true to say that hitherto no amphibian has achieved wide popularity to the extent of being built and sold in numbers comparable with those attained by certain landplane types.

It is probable that amphibians never will become universally adopted. A fairly heavy weight penalty is incurred in enabling the machine to operate equally well from land and water. But that there is a limited field for this type is undeniable. Short Brothers and Harland, Ltd., have produced their Sealand, which is now undergoing development flying and is promising very well.

Now it is possible to announce the founding of a new firm, Sponson Developments, Ltd., which intends to market a new small amphibian 3/4-seater to be known as the "Tribian," the name being meant to indicate that it operates in three media: land, water and air. The new firm, whose address is 3, Albemarle Street, London, W.1, owes its origin to the Hon. Simon Warrender who, when demobilized from the Navy in 1947, met the designer of a small amphibian using sponsons with floats at their ends for lateral stabilization on the water. Shortly after the meeting the designer died, and plans to form a company had to be shelved. However, with the aid of a business friend, Mr. Douglas Reoch, the company was formed some time ago to acquire the designs and patents of the amphibian. More recently W/C. Rex Stocken has joined the board as technical director.



If the finished aircraft follows this model closely the sponsons will not detract from its general appearance.

The work of preparing the design was entrusted to Mr. Marcus Langley, managing director of Tiltman Langley Laboratories, Ltd., which firm is now co-operating in designing the new machine. The model indicates that it will be a very clean design, the wheels of the undercarriage retracting into the sponsons when the machine is on the water.

It may be recalled that in 1946 we described a Norwegian amphibian in which the wheels were also carried on the sponsons, but in addition that machine had provision for mounting skis under the wheels. It relied on the sponsons for lateral stability on the water.

The Sponson "Tribian" will be of all-metal construction, and will be powered by two engines, either Gipsy or Cirrus. The estimated cruising speed is about 140 m.p.h., and the stalling speed 55 m.p.h. The initial rate of climb should be in the neighbourhood of 900 ft/min.

It is the intention that construction of the prototype should be undertaken by Tiltman Langley Laboratories, Ltd., but as they cannot undertake production work, arrangements will be made to have later machines built by one of the existing aircraft firms.

This model of the Tribian emphasizes its elegant lines.

ARBROATH NAVAL AIR DISPLAY

NAVAL aircraft of No. 815 Squadron, which have been using the battleship H.M.S. *Nelson* as a bombing target, last week trained the bomb sights of their Barracuda 3s on a 40-foot model of the famous warship at an air display at R.N.A.S. Arbroath. Sub-Lt. Bradley dived so low over the target that the shouts for him to pull out practically drowned his engine noise.

Unfortunately, the display was marred by bad weather, which curtailed the flying programme and reduced the crowd. Even so, the event was most impressive and some of the aerobatic displays were of exceptional quality. The first was by Lt. Baldwin, D.S.C., R.N., in a Sea Fury. Lt. Petrie and Lt. Ferguson, of No. 801 Squadron, in Sea Hornets, put up such an amazing display of formation aerobatics that even the commentator was shaken to silence. This was certainly the highlight of the programme. Another pilot from 801 Squadron, Lt. Lowder, inverted his machine very low over the crowd, probably to see if the spectators appreciated his antics. After the 801 Squadron had landed-on at close intervals, folding wings as they taxied up the runway, R.A.T.O.G.-equipped Firebrand 4s gave a demonstration of power-assisted take-off. The first took off normally, the second used four rockets, and the third six!

The chestnut that never really does get old—the "spectator" who seizes a Tiger Moth and proceeds to do everything but fly—went down as well as ever. On this occasion the "spectator" was a Mrs. De Vere Twitcher, much better known as Lt. Cdr. L. A. Cubitt, R.N., who fought valiantly with "her" umbrella those who tried to stop "her" display. The display ended with Ceremonial Sunset by naval air apprentices.

54 SQUADRON IN CANADA

AIR MARSHAL W. A. CURTIS, Canadian Chief of Air Staff, and Mr. W. Mills, Deputy Minister of National Defence for Canada, together with Sir Alexander Clutterbuck, British High Commissioner, were among 5,000 people who witnessed the first public aerobatic display by the transatlantic de Havilland Vampires of No. 54 Squadron at Trenton, Ontario, on July 21st. S/L. Oxspring used all seven of his pilots on this occasion: "Blue Section," led by the squadron leader himself, and "Red Section," led by F/L. Wooley, did formation aerobatics which brought spontaneous applause, and F/L. "Jeep" Heal put up a spectacular individual display. All personnel, including the Mosquito and York aircrews, were welcomed by Air Marshal Curtis and A.V-M. E. E. Middleton, A.O.C. Central Air Command. Squadron Leader "Mickey" Martin, Mosquito pilot, obliged with a running commentary.

On July 22nd, the Squadron saluted the city of Toronto with a fly-past which took them below the top of the Commonwealth's tallest building—the Bank of Commerce skyscraper. An aerobatic display was later put on over the Canadian National Exhibition grounds. During the following day, the Squadron saluted Montreal City and performed at St. Hubert airfield, prior to preparing to depart for Washington. The six Vampires touched down at Andrew's Field, near the capital, last Sunday.

A burst tyre (at Bluie West, Greenland) has been the only mishap.

HARWELL

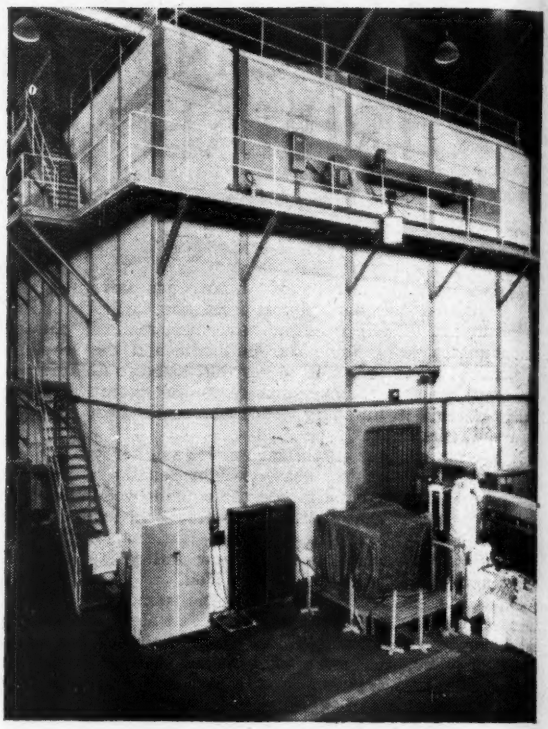
Activity at the Atomic Energy Research Establishment

ALTHOUGH the magnitude of effort put into atomic research work in this country is undeniably smaller than that extant in the United States, it is, nevertheless, by no means inconsiderable. The Atomic Energy Production Organization, under Marshal of the Royal Air Force Viscount Portal of Hungerford, has its design headquarters at Risley, Lancs. In addition to the pile established at Sellafield, Cumberland, on which work started about a year ago, a further plant is nearing completion at Springfield, near Preston, for the refining of uranium from ores and concentrates, and the manufacture of canned uranium rods, both these establishments coming under the direction of Risley. The Atomic Energy Research Establishment, under the direction of Professor Sir John D. Cockcroft, was founded at Harwell in November, 1945, and to complete the picture, the Radiochemical Centre at Amersham will shortly undertake the packing and distribution of radio-active isotopes produced in the Harwell pile

Harwell was, of course, a permanent R.A.F. station before the war and it was chosen for the A.E.R.E. because of its convenient geographical location, combining reasonable access to London with nearness to a large University (Oxford), for it was considered to be important that the staff should have good opportunities for discussion with University colleagues. The permanent buildings of the airfield are very fully used, but, in addition to the conversion of existing buildings, a great deal of new building work has been done and, in fact, is still in progress.

"Gleep" and "Bepo"

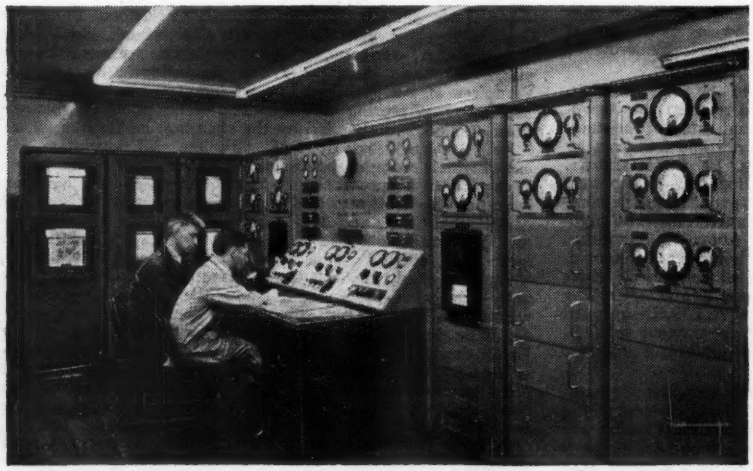
The first requirement for an atomic energy research programme is to build piles, and the first pile, Gleep (graphite low-energy experimental pile), a simple unit designed to develop about 100 kW of energy, was completed in August last year. It is being used for measurement of the properties of atomic nuclei, for testing the nuclear properties of materials used in the construction of piles and for the production of radio-active isotopes for biological, medical, scientific and industrial research. The second pile, Bepo (British experimental pile), has only recently started operation and has been designed to develop 6,000 kW in its uranium metal bars. Although only a slightly larger unit than Gleep, it is a much more complex engineering structure. The basic structure of these piles is relatively simple and takes the form of a hollow cube with wall face-areas of approximately 400 sq yd and with wall thicknesses of approximately 5ft of concrete.



General view of Gleep showing some of the access holes, in the face on the right, through which samples are put into the pile for the production of radio-isotopes.

In the interior of the cube, shaped blocks of graphite are housed, the uranium bars being arranged in horizontal channels through the graphite structure and disposed relative to one another in a lattice formation, the dimensions of which regulate the magnitude of radio-active energy generated. Control is effected by the positioning of neutron-absorbing rods which can be moved in and out of the pile: the farther in the rods are, the slower the reaction proceeds. Two sets of rods are used, the first set being so adjusted as to keep the pile operating at constant power level, whilst the second set is available to shut down the pile in an emergency. Cooling air is drawn through the channels in which the uranium rods lie to remove the heat generated when the uranium atoms break down under fission, and the cooling air, after having been cleansed of any radio-active element, is discharged up a chimney-stack 200ft high. About forty access holes to the pile are provided and, by this means, access can be gained to the strong flux of neutrons in the interior of the pile. In addition, the access holes allow inactive elements to be placed in the pile for transmutation into radio-active isotopes.

It ought perhaps to be explained that isotopes are the two forms of any given chemical element which differ in their radio-active properties. If



The control room of the Gleep pile incorporates various health monitoring instruments as well as power controls.

Harwell . . . . .

certain elements are bombarded with very large numbers of neutrons, such as are present in an atomic pile, they become radio-active. The radio-active elements which are formed have the same chemical properties as the ordinary inactive forms of the elements, but differ in emitting radiation. Most of the materials irradiated in the Harwell piles are in the form either of metals or chemical salts. The procedure is very simple: the substance required is weighed out into a small aluminium can which is placed in a graphite block and the block then pushed into the middle of the pile. There it stays for a suitable time—which might be days, weeks or months—until the enormous flux of neutrons has made it suitably strong in radioactivity. The radio isotope is then ready to be sent to the user. It is packed for transport in a lead-lined box and each box is carefully measured before despatch so as to ensure that no danger to health exists. The levels of radiation permitted are laid down by the Medical Research Council and elaborate means are provided at Harwell for their accurate determination.

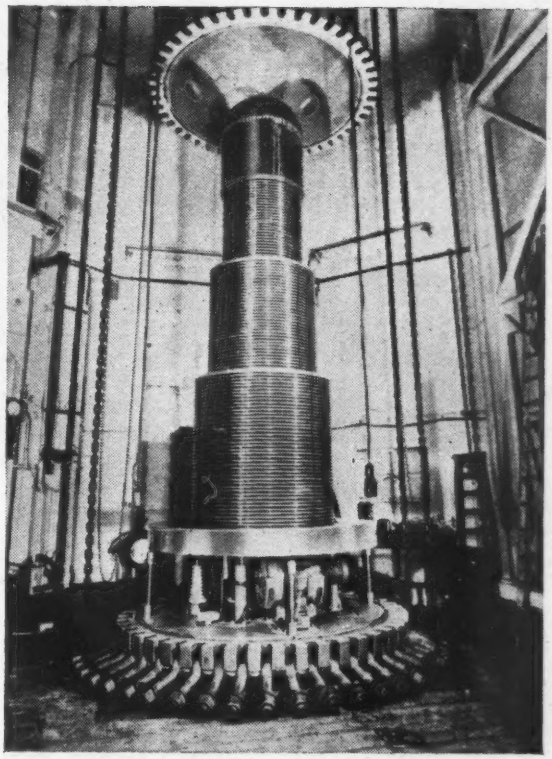
Cyclotron

Among the more spectacular items of equipment at Harwell are the cyclotron and Van de Graaff electrostatic generator. The cyclotron consists of a 700-ton magnet with poles 110in in diameter between which nuclear particles (usually protons or deuterons) can be whirled round in a spiral path and speeded up in successive small steps to energies of 200,000,000 volts. This machine, the largest of its kind in Europe and only second to the 184in-diameter cyclotron in California, will enable the nuclei of most atoms to be broken up into fragments and will provide nuclei of new types which even the piles cannot produce.

The Van de Graaff generator has an output of 5 million volts and is housed in one of the cyclorama towers used for navigational training when Harwell was in R.A.F. hands. The principle of the generator is quite simple. An insulated tower is enclosed in a pressure casing which is filled with gas to a pressure of about 25 atmospheres to prevent sparking to earth. Running up the centre of the tower is a belt-conveyor whereby the electric charge is transferred from earth to the terminal at the crown. The conveyor belt is made of a rubberized fabric and is "loaded" and "unloaded" by a comb of needle points at top and bottom which cause a discharge to and from the belt surface. The 50,000 volts needed to make this discharge occur are provided from an auxiliary supply. The 5 million volts produced by the machine are used to accelerate hydrogen nuclei in a vacuum tube running down the centre of the tower, from which they emerge into a pit below, where they are used to study the properties of atomic nuclei.

The Laboratories

Of the new buildings being constructed at Harwell, the radiochemical laboratory is certainly the most interesting of which anything can be said. This building has been designed for the safe handling of all types of radioactive material in laboratory quantities. It comprises an administrative block containing offices, stores, workshops, conference room and special laboratories for inactive work, and two laboratory wings for radio-active work which are connected to the administrative block by means of air locks and changing rooms. The two wings house twelve laboratory suites, each containing a laboratory, office, shower bath and vestibule, and each laboratory can easily be isolated from the rest of the building. Construction and interior finish is such as to warrant the term "aseptic" in that there is a complete absence of ledges and angular corners in which radio-active dust could be trapped. Lead-lined fume cupboards and specimen store cupboards are integrally built in each laboratory and, as part of the health precaution system, a relatively enormous ventilation plant is provided, the ducts of which occupy the whole upper



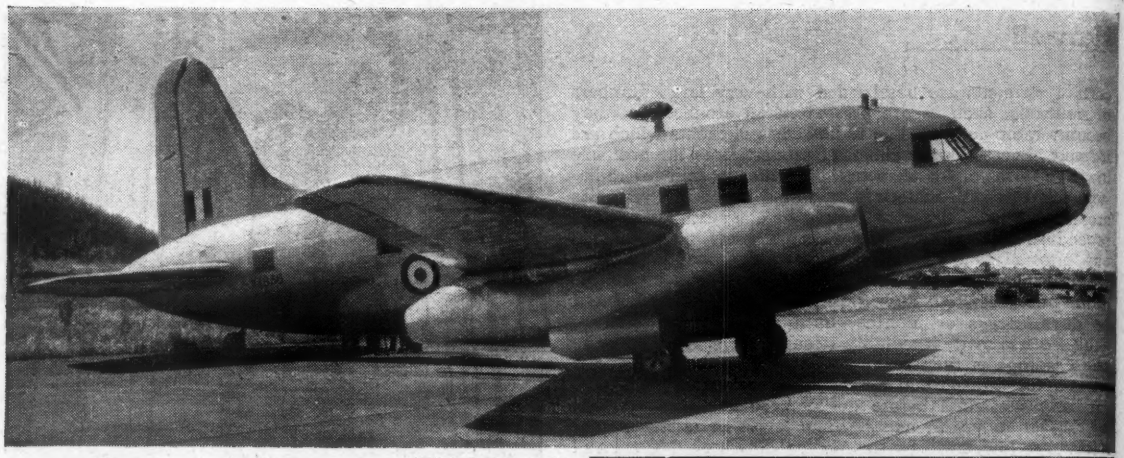
Interior of Van de Graaff 5-million volt electrostatic generator showing, at top, the enclosing pressure chamber.

floor of the building—approximately 60 per cent of the total volume. The rate of air change is extremely high and dispersion of radio-active dusts into the atmosphere with the exhausted air is guarded against by passing the air through electrosatic precipitators.

In our last week's issue, we referred to a paper read before the Detroit section of the Society of Automotive Engineers on the subject of atomic propulsion for aircraft. Whilst at Harwell, we had the opportunity of obtaining the views of the Director, Professor Sir John Cockcroft, on this subject. Put briefly and bluntly, Sir John was quite discouraging. The bugbear lies in the provision of adequate protective shielding against the emission of radio-active rays, and it is an unfortunate physical fact that materials which have effective shielding qualities are those of high specific densities. In this connection, although unable and unwilling to be precise about figures, Sir John mentioned a shield weight of something like 50 tons being necessary for an atomic power plant delivering 10,000 h.p. Furthermore, he thought that this was fundamental and not merely a question of search for some new shielding material. Thus, although we may well see atomic heat source applied to gas turbines for the propulsion of ships and, possibly, trains in the years to come, it would seem to be unlikely that it will extend to the aeronautical field—at least as a useful prime mover.

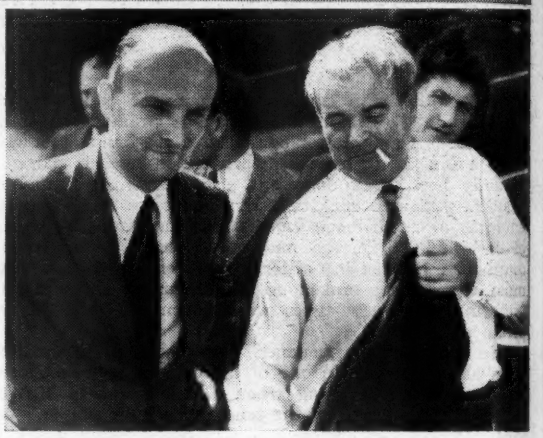
600 M.P.H. SHOOTING STARS

THE fitting of a more powerful Allison turbojet, generally similar to that which propelled a specially prepared Lockheed Shooting Star at 623 m.p.h., enables a new fighter variant—the F-80C—to attain 600 m.p.h. Hitherto the Lockheed Company has been cautious in quoting speed figures for the Shooting Star fighter, but it is now stated that the speed of the standard F-80B is 550 m.p.h. For the F-80C it is further claimed that it has "the greatest range of any operational jet fighter." During the past three years more than 1,000 Shooting Stars have been built and a contract is now in hand for 457 F-80Cs.



"Flight" photographs.

The shapely underslung Nene nacelles blend well with the lines of the Viking. (Right) Mr. J. Summers, chief test pilot, jacketless, and Mr. G. Edwards, chief designer, who took the aircraft to Paris.



FIRST JET TRANSPORT

The Nene-Viking's Debut and Commemorative Flight to Paris

ALMOST creditable and encouraging achievement by a British commercial aircraft was the flight from London to Paris and return made last Sunday by the Nene-Viking to coincide with and commemorate the pioneer Channel crossing successfully completed by M. Bleriot 39 years earlier. Let no mistake be made about the significance of this flight; both the Vickers Viking and the two Rolls-Royce Nenes with which it is powered, are standard, well-tried products which have been combined for the first time to give this country an all-jet passenger transport. This particular aircraft, sponsored by the Ministry of Supply, has been produced for development work, but has now been flying for some months and is no freakish prototype. The Nenes produce much more power than can be safely utilized by the airframe, which was originally designed for operation with medium-sized piston engines at quite low altitudes. The Nene-Viking is, therefore, not an economical proposition for the airline operator. From other points of view it would be a serious commercial product.

Captain J. Summers accompanied by Mr. G. Edwards, the designer, took off from London at about 10.15 a.m. on July 25 and reached Villacoublay in 34 min 7 sec. They returned in the afternoon in 36 min 30 sec. The distance is 222 miles, and the greatest speed reached at the top height of 12,000ft was 415 m.p.h. The average speed was 394 m.p.h.

At Paris, newspaper cuttings concerning the Channel flight in 1909, and letters from the Royal Aero Club, were handed to M. Bleriot's widow, to his son, M. Jean Bleriot, secretary-general of the F.A.I., and to the secretary-general of the French Aero Club. After a luncheon, letters in answer were carried back to Air Marshal Sir Alec Coryton.

Other important Paris-London flights which may be mentioned for comparison have been made recently by S/L. Waterton, who flew a Gloster Meteor over in 20 min 11 sec, averaging 618½ m.p.h., and Capt. Shepherd in the Merlin/Nene Lancastrian which took 41 min and averaged 322 m.p.h.

With the exception of the power plants and main undercarriage, the Nene Viking differs very little from the standard Mark 1B. The gauge of mainplane and tailplane skin has been increased and the elevators are metal covered. All other alterations are concerned with the engines, their controls and test equipment. They include a rearrangement of fuel and oil systems, the installation of test equipment and tanks for jettisonable water ballast in place of the 24 passenger seats.

The new engine nacelles are mounted completely below the wing surface, and this enables the jet efflux to be directed below the standard tailplane. The engine mountings are very simple and consist of three pairs of Vee-tubes attached by quick-release pins and bushes to the wing leading edge member and the undercarriage suspension frames. Like the cowlings, they are specially designed for quick removal and replacement.

The main undercarriage units are entirely different from the standard Viking, and are in the form of pairs of small landing wheels carried on a twin leg assembly with two oleo pneumatic shock absorber legs, and further supported by knee-joint articulating links. One double-acting hydraulic jack on each side causes the wheels to retract and take up their positions astride the jet pipe.

This is the first occasion on which turbojets have been mounted close in beside the fuselage of a transport aircraft, and for the first time it will be possible to accumulate valuable data concerning high and low-frequency vibration and general noise level which will be of great importance in the development of later pure-jet airliners.

Fuel for the Nenes is carried in two pairs of flexible bag tanks of 734 gallons total capacity, installed in the outer wings.

The handling characteristics of the aircraft are reported to be very satisfactory, and it has been discovered that there is a saving in profile drag of 15 per cent over the standard Viking.

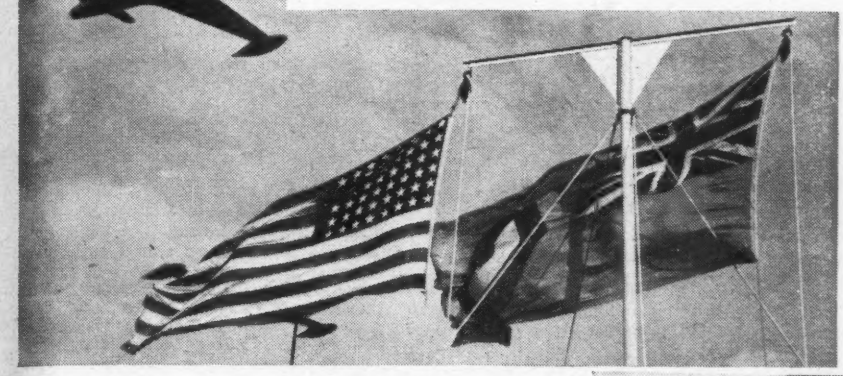
Due to airframe strength factor limitations, the maximum speed of the Nene-Viking must be limited, and weather conditions have a considerable bearing on the safety limit selected. In smooth air (gusts up to 25ft/sec), the permissible top speed exceeds that in rough air by more than 60 m.p.h.

Data for the Nene-Viking

Track (and nacelle centres)	22ft 10in
Take-off weight	34,000 lb
Wing loading (at take-off weight)	38.5 lb/sq ft
Max. speed (smooth air)	409 m.p.h.
Max. speed (rough air)	338 m.p.h.
Cruising speed (smooth air)	395 m.p.h.
Landing speed (touch-down)	92 m.p.h.
Climb to 10,000ft (at 34,000 lb)	3 min
Service ceiling (both engines)	44,000 ft
Service ceiling (one engine)	30,000 ft
Take-off distance to 50 ft (at 34,000 lb., I.C.A.N.)	1,100 yd
Still-air range at 10,000 ft (395 m.p.h., 734 gal)	311 miles
Still-air range at 5,000 ft (371 m.p.h., 498 gal)	242 miles

U.S. Jets Across

Sixteen F.80As from Selfridge Field Land at Odiham



Old Glory flew alongside the R.A.F. ensign when the Shooting Stars arrived at Odiham. (Below) Air Marshal Sir James Robb greets Lt.-Col. David Schilling.

ON Wednesday of last week, a formation of 16 Lockheed Shooting Stars of No. 56 Fighter Group U.S.A.F. completed the first West-East crossing of the Atlantic by jet aircraft by landing at the home station of No. 54 Squadron R.A.F., who had previously made the first East-West jet crossing in Vampires.

A very high and gusty wind was blowing when they arrived and, having been let down through the clouds some ninety miles from the station, the bumpy conditions made their formation of flights astern rather ragged. However, this was soon ironed out as they turned and flew back over the airfield in line ahead. The flights then landed in turn—the orbiting flights passing over the airfield in perfect formation while the others were using the runway. Their landing drill is to follow the leading aircraft down at intervals of about 15 seconds. This gives about 2,000ft horizontal distance whilst in the air and about half that space interval on touching down.

Lt.-Col. David Schilling, who commanded the F.80As, landed first and was met by the Station Commander, W/C. E. T. Smith, and welcomed by Air Marshal Sir James Robb, Vice Chief of Air Staff. Later Air Marshal Sir William Elliot, A.O.C.-in-C. Fighter Command, A.V-M. Vincent, A.O.C. No. 11 Group, and A.V-M. McGregor, A.O.A. Fighter Command, chatted with all the pilots.

Air Marshal Sir William Elliot and A.V-M. Vincent chatting with the American pilots.

The route followed was the same as that taken by the R.A.F. Vampires and the journey from Selfridge Field, Michigan, to Odiham airfield, Hampshire, totalled up to 4,288 statute miles. This was completed in 10 hours 40 minutes flying time. Leaving Selfridge Field on July 12th the formation made Goose Bay, Labrador, the same day after an intermediate stop at Bangor, Maine. Bad weather held them up at Goose Bay, and during this stay one of the engines was changed because of excessive oil consumption. This operation was completed in 4 hours. The Shooting Stars were at Goose Bay when the Vampires landed there but were able to take off for Bluie West, Greenland, on July 17th. The next leg to Iceland was completed on July 19th and the formation moved on to Stornoway the following day. The final section from Stornaway to Odiham was completed on July 21st, their flying time for the 580 miles being 1 hour 40 minutes. The only aids to navigation were radio compasses and V.H.F.

Nearly the whole journey was flown over cloud and at an average height of about 32,000ft. The Lockheed F.80As are all, of course, fitted with pressurized cockpits. The long-range drop tanks carried under the wing tips hold 137.5 Imperial gallons of fuel each, and are marked as being suitable for aromatic fuels. With tanks situated as they are at the extreme tips of the wings, a degree of care has to be taken during rough weather to avoid damage to the wing structure, and if conditions become too bumpy the tanks have to be jettisoned.

On Sunday the Shooting Stars left for Furstenfeldbruck.

Civil Aviation Policy

Lord Pakenham's First Statement in the House of Lords

MANY aspects of British civil aviation were touched upon in the debate initiated in the House of Lords by Viscount Swinton on July 21st. Most important was, of course, the statement made by the new Minister of Civil Aviation, Lord Pakenham, on the purchase of aircraft. We have not the space to deal seriatim with the questions and answers, and will turn first to the Minister's welcome news that not only are the three Saunders-Roe SR 45 flying boats, now under construction, to be completed, but that if all goes well a further four will be ordered, thus giving British South American Airways a fleet of seven of these long-range boats for their South Atlantic service. Lord Pakenham stated that the first of these boats is likely to fly experimentally (he stressed the word) in 1951. When the three boats go into service, about 1953, they should provide accommodation far superior to any competitive type, and should make possible a 26-hour service between the United Kingdom and Buenos Aires.

On the subject of bases, Lord Pakenham said the problem had been provisionally settled, and that the boats will normally operate from Southampton Water, making use of existing facilities and, when conditions make it necessary, will operate from the Solent, with the active co-operation of the R.A.F. at Calshot. (It may be recalled that in his Wilbur Wright Lecture, reported on June 3rd, Sir Arthur Gouge showed the relatively vast spaces available for large flying boats in that district.—Ed.). With the willing co-operation of the Service Ministries, the U.K. flying-boat base was likely to cost only a small proportion of what otherwise would have been needed.

The IV a Good Aircraft

Of the Tudor II Lord Pakenham said the Government was reluctantly but solidly convinced that it must be abandoned; that we must cut our losses on it; and that to persevere with it would simply be to throw good money after bad. The Tudor II was a disappointment, but the Tudor IV was a tried and proved aircraft. Three were already in service, and 16 were being completed. The Government had approved a rearrangement of B.S.A.A.'s fleets under which all 19 Tudor IVs would pass to B.S.A.A. The type would suit that corporation's routes and, they believed, would do exceedingly well.

Lord Pakenham's explanations of the reasons for the decision to order Canadairs was somewhat lengthy. Twenty-two DC-4M-4s would be ordered. This was the latest and improved version of the Canadian North Star type, fully pressurized, air-conditioned and refrigerated, and with a capacity for 40 passengers. The machines would be operated on the main Empire air routes, fifteen to India and the Middle East and seven on the North Atlantic route to Canada. Fifteen would be available within twelve months and the remainder shortly afterwards.

Through the good offices of the Canadian Government, these aircraft would not cost us dollars which otherwise would have been available to us for current spending in Canada. The necessary dollars would be found through the postponement of certain obligations to the Canadian Government for the redemption of debt, thus enabling dollars that would have gone towards those obligations to be applied to the purchase of these aircraft. Thus there would be no immediate dollar outlay. It was estimated that the country would save at least £5 million over five years by buying Canadairs.

Carrying Capacity

Examination of the possibility of converting Tudor IIs into Tudor IVs had shown that this would impose a damaging financial handicap on the corporations and an unacceptable burden on the taxpayers. One might argue about the relative attractiveness to passengers of the two types, but there could be no argument about the superior payload of the Canadair, carried without extra cost: 40 passengers against 32, or a 25 per cent higher earning capacity. In other words, the superiority of payload varied from 3,000lb to 3,500lb according to distance.

Lord Pakenham also stated another reason for the choice of the Canadair. The Tudor's two-wheel undercarriage did not allow it to be landed on some of the Empire airfields, whereas the tricycle undercarriage of the Canadair enabled the load to be spread over five wheels, thus reducing the concentrated loads on the runway.

Turning to the question of the Tudor IIs, Lord Pakenham said that 32, ordered for the corporations, were nearly complete. It was clearly important to preserve continuity of employment in the famous Avro works. At the same time, few would support a policy of simply making work, and he would imagine that the men themselves would be the last to welcome any such idea. He thought they had found a reasonable solution. Negotiations had been opened for the purchase of 21 Tudor IV pressurized freighters for B.O.A.C. and B.S.A.A. These would be converted from redundant Tudor IIs. Pressurized freighting was an entirely new business "of which your Lordships are not aware," and offered important prospects as a valuable addition to our air transport services. The development of a freighter with large doors and pressurization raised many technical problems and might take some time to work out.

While this was being done, the Government had given instruction to proceed with the conversion of ten of the Tudor IIs to Tudor IV freighters so that there would be no delay in the commencement of the work. (The Parliamentary Secretary to the Ministry of Civil Aviation, Mr. Lindgren, made the position a little clearer in the House of Commons by stating that the conversion of the ten was into unpressurized freighters.—Ed.). Lord Pakenham said the Ministry of Supply wanted a number of Tudors for research purposes, so that in one way or another they might reasonably look forward to 24 of the Tudor IIs being converted for useful service. He stressed the fact that the converted Tudor IIs to be rebuilt as Tudor IVs would be additional to the 19 Tudor IVs complete or nearing completion. These will be used on the main passenger routes of B.S.A.A.

Lord Pakenham thought that the fact that B.S.A.A. intended to build up a unified fleet founded almost entirely on the Tudor IV showed that this aircraft was considered by them, and by M.C.A. and M.o.S., an excellent aircraft. The decision to buy Canadairs affected a single product, the Tudor II. It would be grossly misleading, therefore, to represent the Canadair purchase as showing a lack of confidence in the Avro firm, let alone the aircraft industry as a whole. The prestige of the aircraft industry and of the Tudor IV were not in question. The fact that the orders he had mentioned, and those for the Hermes, the SR 45 and others, some 100 new aircraft in all, would amount to some £25,000,000 should be regarded as clear evidence that the Government recognized that the fortunes of the British aircraft industry and the British airline operators were indissolubly linked.

Of the operations by the corporations Lord Pakenham said that it was hoped the chairman would be able to present reports and accounts by September 30th. In the meantime, indications were that the losses incurred will be in excess of the amount payable to them in subsidies. This year the subsidy drops to £8,000,000 and there would be the greatest difficulty in bringing the deficits down to that figure. He added that during the year 1947-48 B.E.A.C. deficit on direct operation was only £24,000 on the European services, whereas the total was about £1,000,000. The majority was lost on the internal services. During the current year he hoped to see a direct operating profit on the European services.

Other Views

In the debate, little emerged that was new. The Minister of Civil Aviation tried, before telling Their Lordships some grim truths, to sugar the pill by giving some figures of the increase in passenger-miles flown and other traffic statistics. To this Lord Balfour of Inchrye retorted that anyone can sell pound notes for nineteen and sixpence.

The Duke of Sutherland did not believe the expenditure of all those millions of dollars was necessary. He thought the improved Tudor IVs could have been used on the Empire routes, and a few more Constellations ordered for the Atlantic route in addition to those taken over from the Irish Government.

The Marquess of Willingdon put in a plea for the staff of the corporations to be given a chance. They saw boards of directors, part-time directors, and, with possibly one exception among the twenty-five or thirty directors, none had been promoted from service in the corporations.

Viscount Knollys thought the decision to buy Canadairs was regrettable but inevitable. He congratulated the Minister

on having produced a definite policy, which would give B.O.A.C. a firm basis on which to plan, the first time this had been possible. He only regretted the cost in wasted money, time and energy before a long-term policy was decided upon. He wondered whether we were giving the best possible chance to the aircraft manufacturers. We should not get one new type by the time we expected them unless the present method of ordering was radically changed. There was no chance of getting "winners" under the present method.

Lord Waleran put in a plea for the really large flying boat, the flying ship. He was thinking in terms of boats twice as large as any built hitherto, including the Howard Hughes. He thought we should go first for the really fast high-frequency aircraft, such as the D.H.106, but let us also have our "slow old lady travelling at 250 knots, crossing the Atlantic in twelve hours."

Lord Sempill was glad to hear that the Saunders-Roe SR-45 was not to be scrapped, but he suggested that a number of these boats should be ordered for military purposes, so that instead of only four more being ordered, another six or seven should be ordered, thereby spreading development cost over a larger number and gaining operational experience in the military as well as in the civil field.

Lord Gifford also spoke on behalf of the flying boat. He was glad it was to be used on the South American route, but asked what was intended on the Empire routes. Speaking as a travel agent, he had found that nearly all his clients preferred the flying boat. Surely, if passengers wanted flying boats they should have them. With large flying boats it would be possible to give the passenger a small single-berth cabin, a dining saloon, and a comfortable lounge.

Viscount Samuel suggested the time had come when there should be a fundamental enquiry into the right form of ministerial and commercial organization of civil aviation. It might be found that it was not necessary to have a Ministry of Civil Aviation at all. The present plan was extremely complicated, responsibility divided, and the working of the system dilatory. Such an inquiry might best be placed in the hands of a Committee of the Privy Council.

Viscount Addison replied.

The Tudor Story

Muddle Without Parallel in British Aviation

ONE month after being submitted to the Minister of Supply, the Final Report of the Committee of Enquiry into the Tudor Aircraft was published on July 20th. The committee, it will be recollected, was appointed in September, 1947, under the chairmanship of Air Chief Marshal Sir Christopher Courtney, the other members being Mr. James Mould, Mr. J. J. Taylor, and Mr. G. Wansbrough. The latter resigned from the committee in February, 1948, and consequently his signature is not attached to the report.

Specification

The report points out that proposals for the construction of the Tudor II were originally put forward by A. V. Roe and Co., Ltd. (incidentally, it leaves out the "and Co."), in the autumn of 1943. B.O.A.C. and the Ministry of Civil Aviation were concerned in the preliminary discussions, and in November, 1944, a draft specification was drawn up, which was finally agreed to and issued in December, 1944. It called for a payload of 8,275 lb for a range of 2,800 miles, or of 9,675 lb for 2,600 miles, both at 25,000ft. Take-off run was to be not more than 1,200 yards to clear 50ft at sea level against a 5 m.p.h. wind. The cabin was to be pressurized, and to have accommodation for 41 day passengers or 22 sleeping. No all-up weight was specified, so that the designer was free to determine what was the most this could be if the performance was to be attained. It was thought that it might be of the order of 76,000 lb.

In March, 1946, the first flight was made, and the machine was found to suffer from aerodynamic troubles similar to those which beset the Tudor I, but to a smaller degree. It was sent to Boscombe Down, but returned to the makers before the trials were completed, in order that the improvements found desirable after the Nairobi trials of the Tudor I might be incorporated. This work was well advanced when the machine crashed (as a result of a reversal of the aileron controls, and Roy Chadwick and Bill Thorn were among those who lost their lives). "This unfortunate accident," the report states, "deprived the firm not only of the accumulated experience of the two men most closely concerned with the technical development of the Tudor II, but also of the only aircraft then available for test flights."

Alterations

The report points out that until the summer of 1946 it was necessary for B.O.A.C. to co-ordinate their requirements with those of the Commonwealth operators. It was originally decided that all the aircraft should be equipped with convertible day and night accommodation. This necessitated an increase of 2ft in fuselage length and an increase in weight. In May, 1945, B.O.A.C. decided not to have sleeping accommodation on certain routes, and gave priority to the Pullman version, of which 20 were wanted. A further increase in fuselage length resulted. In July, 1945, there was yet another change in layout, and priority reverted to the day-and-night version. After inspection of a mock-up in September, 1945, B.O.A.C. called for various alterations. The inevitable delay was accepted by M.C.A., who promised that no further modifications would be asked for. That promise was not kept. In October, 1945, a new colour scheme and a rearrangement of the dressing rooms were asked for by an industrial designer. This entailed purchase of new materials. Another delay of six months. In December, 1945, B.O.A.C. put forward a request for a new type of chair convertible into a bunk.

Work went on during 1946 on the requirements put forward by B.O.A.C. and Commonwealth operators. Not until February, 1947, did B.O.A.C. indicate that only six machines of the sleeper version would be required. The report blames the corporation for not taking the opportunity to make a substantial saving in weight by abandoning the heavy convertible arrangement.

It is interesting to examine how all these vacillations affected the aircraft. In the original 1943 conception, the fuselage had an overall length of 95ft, with a maximum diameter of 10½ft. In its final stage these figures grew to 105½ft and 11ft respectively. The 1943 estimate for tare weight was 44,810 lb. In February, 1948, this had grown to 55,417 lb, an increase of nearly 24 per cent. An agreed specification in December, 1944, showed a tare weight of 47,765 lb, so that the difference between this and the 1948 figure is 7,652 lb.

How the Weight Increased

A revealing light is thrown on the way in which these weight increases came about. By the autumn of 1945 it was becoming clear that the gross weight was likely to exceed the original estimate of 76,000 lb by more than 4,000 lb. At a conference in November, 1945, Avros put forward suggestions which would have saved that weight. A compromise was reached, which saved less than 2,000 lb. One reason was that B.O.A.C. would not accept proposed changes in accommodation. During the following months, the gross weight again crept up to 80,000 lb. "The corporation," the report states, "though professedly anxious about the possible effects of excessive weight, deprecated on a number of occasions any proposal to improve matters by economizing in the standards of furnishing." As another example of this sort of attitude the report quotes freight spaces under the cabin floor. It was argued that this large cargo space would have contained 8,000-8,500 lb of cargo, which could be used when passenger demand fell off. "We cannot consider it reasonable," the report comments, "to demand cargo space sufficient to absorb about 90 per cent of the maximum payload."

In June, 1946, a review showed that suggested reduction of range requirements was not feasible. The report states, very pertinently: "Faced with this conclusion, the corporation might have been expected immediately to set about investigating the possibilities of saving weight in interior accommodation equipment which they had hitherto declined to consider. No such step was taken, nor have we been given a satisfactory reason for this omission." A year later, when a change of management took place, economies in furnishing amounting to over 2,000 lb were agreed, but no decision was taken to alter the furnishing arrangements.

Payment for Modifications

This sombre picture of muddle is not confined to technical matters. On the financial side we find another source of delay. Avros had proceeded with alterations to the sleeper version as requested by B.O.A.C., some 340 requirements being involved. But B.O.A.C. were not prepared to commit themselves to paying for redundant material. The Ministry of Civil Aviation did not feel able to authorize expenditure on work peculiar to the corporation's requirements unless given an assurance that B.O.A.C. would ultimately take over the aircraft and pay full cost, including modifications. The Civil Aircraft Modifications Committee therefore placed a number of modifications in abeyance and confined approval to such as were essential for airworthiness. In October, 1947, B.O.A.C. declined to make a decision until they had inspected a complete aircraft, and even then they did not commit themselves to operation of the aircraft, even if the layout proved acceptable. The Ministry of Civil Aviation were not prepared to risk expenditure which might prove to be nugatory. It was not until January, 1948, that the deadlock was broken by the Ministry of Supply assuming responsibility for authorizing work necessary to bring the first production aircraft up to the full B.O.A.C. modification standard.

At the same time as the publication of the Courtney Report, the Ministry of Supply issued a Press Notice concerning Boscombe Down trials of the Tudor II. The notice is too brief to be of any value and merely states that performance is disappointing and that the aircraft required a take-off distance which would preclude commercial operation from certain existing airfields on the Empire routes, and that its range was less than had been expected. The issue of the notice was carefully timed to have the greatest effect in supporting the Government's decision, but to many it seems a case of kicking a man when he is down

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

NEXT GENERATION OF PILOTS

Use of Public Institutions the Answer

MAY I comment on your editorial of June 17th, 1948, in which you ask how the initial training for future civil airline pilots is to be provided.

The two-year Air Cadet Course of the School of Navigation of University College, Southampton, is the public education authorities' answer to this question.

The use of public institutions such as the School of Navigation has the following advantages:

(a) Nominal fees because of substantial grant aid from the Local Education Authorities and the Ministry of Education.

(b) Necessitous students may receive grants-in-aid from their own Local Education Authorities.

(c) Inspection and supervision by the Ministry of Education which would not tolerate poor instruction, inefficient staff or, in fact, anything which had an adverse effect on the training of students.

Thus, without cost to the industry, civil aviation will be provided with young men who, like other professional or technical graduates, will be properly trained and basically qualified, but lacking in practical experience.

The provision of the further practical experience so necessary before a pilot becomes responsible for large passenger aircraft can surely be met, either by direct apprenticeship to the large corporations or experience in feeder airlines.

University College, Southampton. G. W. WAKEFORD, Director.

BRITAIN'S FUTURE BIG AIRLINERS

The Need for Proven Engines

From Sir Roy Fedden, M.B.E., F.R.S.A., D.Sc., F.R.Ae.S., M.I.M.E., M.S.A.E., M.I.A.E.

I NOTICE that you refer in your issue of July 22nd to the recent correspondence of Mr. Verdon Smith and myself in *The Daily Telegraph* in regard to the power plant for our new vintage of big airliners of the future, machines in the category of 100 tons and over.

I hasten to call your attention to one or two points in your leader, which I suggest may be open to criticism. If you will cast your mind back over the past, I am sure you will agree that it is hardly fair to dub me a Cassandra on internal combustion turbines as a whole. I feel convinced that you have quite recently heard how appreciative I am of our position and progress on the pure jet engine, and that I believe we comfortably lead the world in this field. I do not take that same view in regard to the large airscrew turbine intended for long range, first, because I believe it has so many more complex problems to solve, but far more important is the fact that, no matter how clever our engineers may be, there is no final answer, or royal road to success, except long mass-testing over literally hundreds of thousands of hours on several military types and on several hundred engines.

In saying this I am not penalizing the large airscrew turbine especially. The same hard school is necessary on any high-power aircraft engine, and this has been a rule that has never been broken so far in the history of aviation.

No aircraft engine of high power over the last thirty years has ever come to full fruition except along this one road of military air-testing.

I suggest you have no evidence or proof to promulgate the view that a large airscrew turbine is a much easier and quicker proposition than a piston engine to develop until fully fledged. I believe this is an erroneous opinion, and I know of no evidence to the contrary, either in this country or the U.S.A.

I submit a 3,000-5,000 h.p. geared prime-mover for aircraft, driving an airscrew, no matter of what type, is no sinecure, and in any case is a difficult and long drawn-out job; but far more important than this, even were the airscrew turbine easier, you seem to pass over somewhat lightly the fact that there is no short cut to the hundreds of thousands of hours of airborne "know-how" that must go into a long-range aircraft power plant before it is safe and reliable. How is this going to be given except by the old established formula?

You rightly call attention to the excellent performance of one Theseus engine to date, or perhaps to two or three of these. This engine is six years old, and not more than a dozen have been constructed. I submit that if during the next two years several hundred of these engines have been through the mill in the air, then we may talk about a safe engine for the North Atlantic service.

I have no doubt the 3,000-4,000 h.p. Proteus, the big brother of the Theseus, and intended for our big airliners of the future, will in due course be an even better engine, but it is years behind the Theseus in time of initiation and must go through exactly the same hard school to win its spurs. Any old hand at the game knows that you cannot step-up an engine size, even with exactly the same school of thought of design, and get away with it without the full gamut of air testing. Those who have tried have consistently rued the day.

Your leading article goes on to dilate on the present difficult position we are in on civil aviation and I feel that in so doing you are yourself backing up my argument and drawing attention to an exactly similar position, which may well occur on the big machines in five to seven years from now.

Our big airscrew turbines are not, so far as I am aware, scheduled for any military types at present. Why should we receive this special dispensation from Heaven on this entirely new prime mover, and how can we persuade ourselves we can avoid going the hard way?

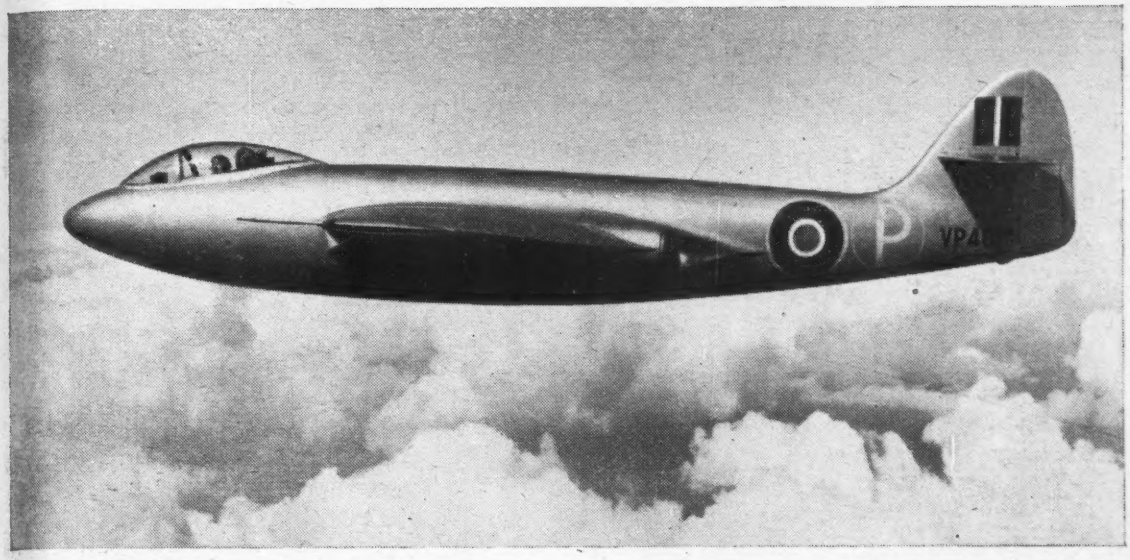
The large airscrew turbine is a most interesting and promising power plant, but there are numerous "bugs" to be got out of it. I cannot put my head in the sand over it, no matter what unfortunate or rash official decisions were made on it two or three years ago. I sincerely hope everything goes right with it quickly and according to plan, but I believe we must have an insurance or else we are making ourselves a party to the possibility of a similar position arising in five or six years' time to the one we are in to-day on our 35-ton airliners.

I submit you are not strengthening your argument by contributing to the thesis that the time has now come when the civil machine must be entirely divorced from the military. This may be an ideal to work to, but it is entirely impractical to-day. There simply is not the money, the time, nor the engineering capacity in the country to make this possible. The Constellation and the Skymaster started as civil conceptions, but as soon as the U.S.A. came into the war, these two machines were given the military transport nomenclature of C.69 and C.54. Enormous sums of money and unlimited resources were poured into both, and production military transport orders given, with the result we all know. Congress has just ordered considerable numbers of a new military transport which will become the airliner of to-morrow. If America, with her much bigger market and considerably greater annual air mileage, finds it wise to adopt such tactics, how can we branch out on a far more grandiose and idealistic scheme?

London. ROY FEDDEN.

FORTHCOMING EVENTS

July 31st.—Aero Club of Orange Air Rally.
Aug. 1st.—Boroden Cup for Model Aircraft with mechanical engines, London Region.
Aug. 7th.—Air Meeting and Competitions at Ypenburg, Holland.
Aug. 7th.—Midland Aero Club: "At Home," Elmdon airport.
Aug 14th.—R.Ae.S. (Graduate and Student): Visit to National Physical Laboratory, Teddington.
Aug. 14th and 15th.—Butlin's Week-end Air Rally at Pwllheli, N. Wales.
Aug. 15th.—Wiltshire Flying Club: Thruxton air races, Thruxton airfield, Andover, Hants. (Altered from Aug. 21st.)
Aug. 15th. — Rochester Flying Club: "At Home" The Airport, Rochester, Kent.
Aug. 18th to 28th.—Model Engineer exhibition, New Royal Horticultural Hall, Westminster.
Aug. 21st.—R.Ae.S. (Brough) and Brough Flying Club: Garden party and flying display. Brough airfield, East Yorkshire.
Aug. 21st to 29th.—International Aviation Week, Grenchen airfield.
Aug. 22nd.—Cowes Aero Club: Annual air display, Cowes airport, I.O.W.
Aug. 26th.—R.Ae.S. (Glasgow): Lecturettes, Grand Hotel, Glasgow.
Aug. 26th to Sept. 11th.—Machine Tool and Engineering exhibition, Olympia, London.
Aug. 27th to Sept. 5th.—Aero Club de France. "Tour de France."
Aug. 28th—R.Ae.S. (Graduate and Student): Visit to Vickers-Armstrongs
Aug. 28th and 29th.—Cinque Ports Flying Club: International flying meeting, Lympne airport.
Sept. 4th.—Northants Aero Club: Air display at Sywell.
Sept. 7th to 12th.—S.B.A.C. Exhibition and Display, Farnborough airfield, Hants.
Sept. 18th to Oct 3rd.—Copenhagen Show, organized by the F.B.I.
Sept. 25th and 26th.—Butlin's Week-end Air Rally at Ingoldmells, Skegness.



HAWKER'S FIRST JET : For many months the first photographs of the Hawker N.7/46 jet fighter (R.-R. Nene) have been impatiently awaited. This view shows its beautiful lines to particular advantage. Intake and outlet arrangements are also apparent. A brief description and two more photographs appear on page 130.

SERVICE AVIATION

New Principal Chaplain (R.C.)

THE appointment of the Rev. John Lavin as Principal Chaplain (Roman Catholic), Royal Air Force, with the relative rank of group captain, with effect from June 15, 1948, is announced. Formerly Assistant Principal Chaplain (R.C.) Southern Area, since, 1943, he succeeds the late Rt. Rev. Monsignor H. Beauchamp, C.B.E., M.C.

R.O.C. Recruits Wanted

TRIBUTE to the invaluable work performed by the Royal Observer Corps during the war was paid by Air Chief Marshal Sir Phillip Joubert at a meeting of No. 19 Group at R.A.F. Station, Kenley, on July 11th. The strength of the Corps had dwindled since the war, he said, operations rooms in particular being short of personnel, and he urged members to introduce their friends to the R.O.C. at the first opportunity. The use of radar, which had mechanical limitations, by no means lessened the responsibilities of the Corps to the Royal Air Force, he added.

In spite of bad weather 300 members attended the meeting and a number of them were given flights in Ansons and a Dominie from No. 61 (Reserve Command) Group. Poor visibility eventually led to the termination of the flights and a number of instructional films were shown instead.

Return to Tangmere

NO sooner had No. 605 (County of Warwick) Squadron, R.Aux.A.F., concluded its annual camp at Tangmere in August, 1939, than it was mobilized and took up its first war station there, being equipped with two flights of Gladiators and Hurricanes. Now, nearly nine years later, the squadron has just completed another camp at Tangmere, some 60 Auxiliary air and ground crew and 30 regulars taking part. A target figure of 240 flying hours was set and the squadron, by living up to its motto of *Nunquam Dormio*, just managed to beat the target. In addition to the air-to-sea and air-to-air firing exercises, conversions were carried out on Mosquitoes, Harvards and Spitfires.

The highlight of the camp was the arrival, on the seventh day, of the squadron's first Vampire 3, No. 605 being the first Auxiliary unit to be equipped with jet aircraft. Now the whole squadron, with the possible exception of the navigators, is looking forward to the day when the existing Mosquitoes have all been replaced by jets. Incidentally, one navigator has suggested that the Vampire could easily be converted to a two-seater by placing an occasional seat between the two booms!

At the conclusion of the camp, for the success of which tribute is paid to the regular personnel, the squadron flew back to Honiley from Tangmere to be greeted by its Honorary Air Commodore, A. Cdre. J. A. C. Wright, who previously had spent two days at the camp with the squadron.

Royal Air Force and Naval Aviation News and Announcements

Australia Wants British Ratings

A NEW recruiting scheme announced by the Royal Australian Naval authorities in London offers engagement to about 1,000 ex-Royal Navy ratings, with an opportunity of settling in Australia on completion of their service.

Two hundred volunteers from the United Kingdom are needed to complete the complement of the aircraft carrier *Terrible*, due to commission as H.M.A.S. *Sydney* in November. The remainder will serve in shore bases and establishments in Australia or help to man other ships of the Royal Australian Navy, including a second carrier, H.M.A.S. *Melbourne*, to be acquired from Britain later.

The two carriers which are of the Majestic Class, will be specially fitted for service in the Pacific and equipped with Sea Fury, Firefly and other aircraft.

All enrolments will be made within the next two or three months, and applications accompanied by R.N. Service Certificates may be made to The Australian Naval Liaison Officer, Canberra House, 85, Jermyn Street, London, S.W.1.

Appointment

A CDRE. PAUL SANDLAND BLOCKEY, C.B.E., who commanded the Royal Air Force Station at Cosford from September, 1946, until recently, has been appointed Senior Technical Staff Officer, R.A.F. Transport Command. An engineer officer, who transferred from the General Duties branch to the Technical branch of the R.A.F. in 1940, he served in the Directorate of Repairs and Maintenance, first at the Air Ministry and afterwards at the Ministry of Aircraft Production, from August 1939, until October 1940, when he was posted to Headquarters of No. 43 Group, Maintenance Command. He went to Air Headquarters, India, in August 1943 and shortly afterwards to No. 226 Group, in India. In the following year he was appointed engineer officer of No. 230 Group, Air Command, South East Asia, and Air Officer Commanding the Group a few months later. He became

Service Aviation . . . . .

Chief Engineer Officer, Air Headquarters, Burma, in March 1945, Senior Engineer Staff Officer, Base Air Forces, South East Asia, in the following November, and Chief Engineer Officer, Air Command, South East Asia, in April 1946.

Medical Services Appointment

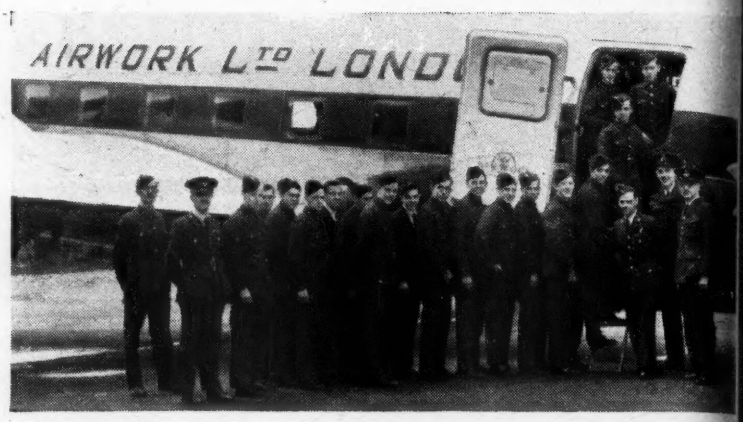
DIRECTOR-GENERAL of R.A.F. Medical Services since March 1, Air Vice-Marshal P. C. Livingston, C.B., C.B.E., has been granted the acting rank of air marshal, with effect from July 1. Air Marshal Livingston, who was recently appointed an Honorary Surgeon to the King, was born in March, 1893, and joined the Medical branch of the R.A.F. in 1919. He rowed in the winning Cambridge crew in the 1914 Boat Race and he has been president of the R.A.F. Rowing Association since its formation last year.

Permanent Commissions

THE following officers have been selected for permanent commission in the R.A.F. in the branch shown:—

General Duties Branch

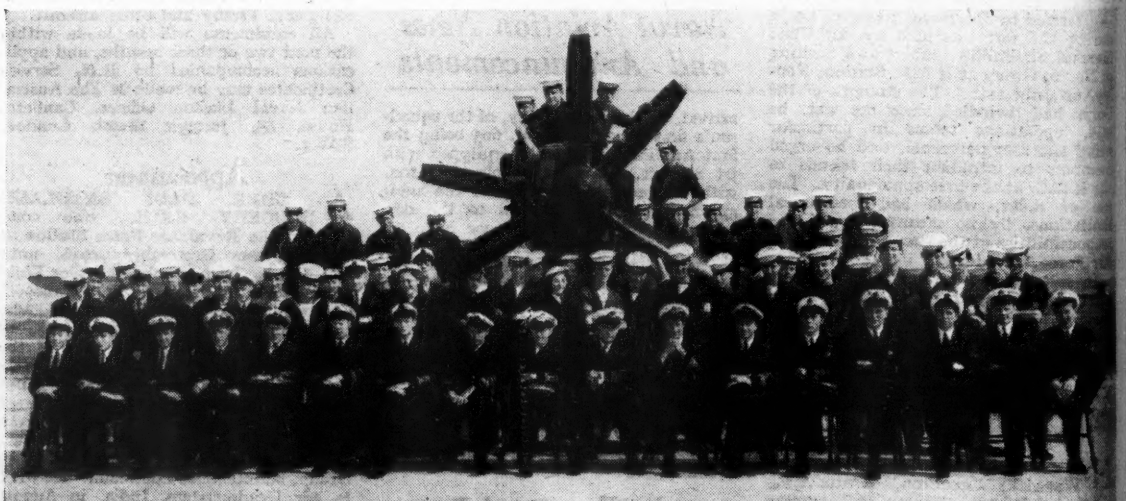
Wing Commanders: D. A. P. McMullon, D.F.C.; A. C. Stewart, D.F.C. Squadron Leaders: C. B. Brown, A.F.C.; T. R. Fox, D.F.C.; A. W. Griffiths; C. Haw, D.F.C., D.F.M.; P. J. Kelley, D.F.C.; K. B. McGlashan; S. G. Nunn, D.F.C.; C. N. O'Brien; J. R. Pennington-Legh, D.F.C.; E. A. Rockcliffe; A R. Rush; W. A. Smith, D.F.C.; B. Spray; P. D. B. Stevens. Flight Lieutenants: E. G. Alcock; R. Anderson; D. W. Bedford; R. K. Brown; R. P. Burton; W. F. Caldow, D.S.O., A.F.C., D.F.M.; C. W. Clark; D. A. C. M. Comer, D.F.C.; F. W. Davison; H. J. Dodson; R. Edwards, D.S.O.; F. C. Ellis; J. C. Forbes, D.F.M.; J. R. Forsythe, D.F.C.; J. W. Frost, D.F.C.; L. C. Glover; A. Griffiths; N. L. Hartley; E. L. Heath; V. H. Hemming; D. R. Higgin; L. G. Hobbs; D. Houghton; K. Johnson; J. King; A. J. H. Kitley; L. J. Madders; D. G. Maddocks, D.F.C.; P. R. Mallorie; A. E. Marriott; B. S. Martin; E. Martin, D.F.C.; K. L. Monaghan, D.F.C., D.F.M.; E. R. Morriss; B. P. Mugford; G. Murphy; S. A. Nunns, D.F.C.; M. J. O'Bryen-Nichols; E. K. Paine; D. D. Pearce; N. Poole; P. A. Rowell, A.F.C.; D. C. Saunders; W. J. L. Sheehan; J. E. Simmonds; J. R. Spiers; R. J. S. Spooner; C. N. Spurdens, D.F.C., A.F.C.; G. D. Sutcliffe; W. A. Sutton; D. A. Taylor, D.F.C.; E. A. Tennant, D.F.C.; J. K. Thompson; C. A. Tomlinson; R. Turner; W. D. B. Waddington, D.F.C.; P. M. Walker; W. C. Walton, D.F.C.; A. Warnecke; C. Watkinson, D.F.C.; J. G. Wilkins; K. C. Wilson; W. A. Wright. Flying Officers: G. W. Abel; F. C. Alston; K. J. Appelboom; P. S. Bennett; R. S. Bingham; D. Bish; G. C. A. Brie; J. E. Burton; A. C. Capper; P. J. Carty; L. DeGaris; W. Edwards; K. L. Hirst; M. W. Horsley; R. J. Hough; D. MacIvor; A. L. Miller; J. H. W. Moodie; K. L. Morris; R. Neil; F. Newman; J. F. Nyffeler; D. G. F. Palmer; D. A. Perkins; J. H. Phillips; M. J. C. Regester; A. Rowden; D. K. Roxberry; J. A Ryan.; R. T. Saunders; J. A. Steff-Langston; D. R. Stratton; J. G. W. Stroud; A. Veale; K. E. Williamson.



ALL ABOARD ! Officers and Cadets of No. 153 Squadron, A.T.C., about to enter a Viking at Blackbushe Airport for a flight to the South Coast and back. The cadets were spending the day as guests of Airwork Ltd., who arranged the flight, first taking the squadron on a conducted tour of the airport and then entertaining them to lunch.

A.C.F.E. Athletic Championships

R.A.F. Station Changi, won the Air Command Far East Athletic Championships, recently held at Singapore, with R.A.F. Seletar second, and R.A.F. Hong Kong third. Other stations competing were Tengah, Sembawang and Ceylon. A.C.F.E. records for the 440 yards, pole vault, javelin, discus and the hop, step and jump were broken during the meeting. Prizes were presented by Lady Lloyd, wife of Air Marshal Sir Hugh P. Lloyd, Air Officer Commanding-in-Chief, Air Command Far East.



CORNISH CAMP ; Squadron officers and some of the ratings of No. 1832 R.N.V.R. Air Squadron at the summer camp held this year at R.N.A.S. Culdrose, Cornwall. Seated in the centre of the front row is Lt. Cdre. I. P. Godfrey, O.B.E., R.N.V.R., Officer Commanding the squadron. On his right is Lt. R. G. Robertson, D.S.C., R.N., Lt. (A) A. Sachnovsky, D.S.C., R.N.V.R., Lt. (A) H. K. Quilter, D.S.C., R.N.V.R. and Lt. (A) C. R. Jeffs, R.N.V.R. On his left is Lt. (A) G. Mc. C. Rutherford, D.S.C., R.N.V.R., Lt. (A) G. R. Wilcocks, D.S.C., R.N.V.R., Lt. (A) A. R. Michie, R.N.V.R., Lt. (A) T. O. Adkin, R.N.V.R., Lt. (A) P. J. Robins, R.N.V.R. and Lt. H. Chapman, R.N.